

3 質問状及びその回答

QUESTIONNAIRE FOR THE AFTERCARE PROGRAMME ON THE TECHNICAL COOPERATION PROGRAMME FOR THE PROJECT ON FOUNDRY TECHNOLOGY UNIT(FTU) IN SIRIM

To: the Authorities Concerned of the Government of Malaysia
From: the Authorities Concerned of the Government of Japan

I. CONCEPT OF THE AFTERCARE PROGRAMME

The Aftercare Programme is one of the Technical Cooperation Programmes implemented by Japan International Cooperation Agency (hereinafter referred to as "JICA") in order to promote the output of the projects which already terminated by extending supplementary technical cooperation within the following scope. The said scope is subject to change within the limitation of the budget as well as the availability of the personnel dispatched as the experts.

1. Taking additional care of the machinery and equipment already provided by the Government of Japan
 - (1) by dispatching short-term experts for repair and maintenance
 - (2) by providing necessary spare parts and consumables
2. Supplementary technical cooperation within the scope of the Record of Discussions (hereinafter referred to as "R/D")
 - (1) by dispatching short-term experts
 - (2) by providing necessary machinery and equipment
3. Training of counterpart personnel in Japan is not included within the scope of the Aftercare Programme in principle.
4. The Aftercare Programme for the Project will be extended from the date of the signing of the Minutes of Discussions for the Programme, March, 1998 to March, 1999.

In this connection, JICA plans to implement the Aftercare Programme on the Technical Cooperation for the Project on Foundry Technology Unit in SIRIM (hereinafter referred to as "the Project") during the Japanese fiscal year 1998, and to send an Aftercare Study Team within the Japanese fiscal year 1997.

The Purpose of the Team is to survey the present situation of the Project and to work out the details of the Aftercare Programme on the Project through a field survey and a series of discussions with the authorities concerned of the Government of Malaysia.

In order to make the activities of the Study Team as effective as possible, JICA needs to get relevant data and information on the present situation of the Project by asking some questions mentioned below. It would be highly appreciated if the authorities concerned of the Government of Malaysia prepare the answers and send them back through JICA Malaysia Office at its earliest convenience, not later than January 23, 1998.

II. Questions for the Implementation of the Aftercare Programme on the Project.

1. Contents of the Aftercare Programme

(1) Taking additional care of the machinery and equipment already provided by the Government of Japan

- a Name, specification, maker, date of provision, and present condition (e.g. operation, maintenance) of the machinery and equipment provided by JICA;
* Please fill in the attached documents (Appendix 01).**
- b Necessity of repair by Japanese experts, necessity of spare parts and consumables to be provided by JICA, and availability of spare parts and consumables in Malaysia and the quotations;
* Please fill in the attached documents (Appendix 02).**

(2) Supplementary technical cooperation within the scope of R/D

- a The themes within the scope of R/D which need supplementary technical cooperation by the Japanese short-term experts and the detail contents of the task for the said experts;
* Please fill in the attached documents (Appendix 03: If you need more than one, please make photocopy.).**
- b Name, quantity, specification, maker, reasons of necessity, availability in Malaysia and the quotation of the machinery and equipment needed to be provided in order to transfer the technology on the said themes ;
* Please fill in the attached documents (Appendix 04: If you need more than one, please make photocopy.).**
- c Plan for assignment of the Malaysian counterpart personnel for the Aftercare Programme;
Number, name and age, sex, their present position and their qualification.
* Please fill in the attached documents (Appendix 05).**

2. Organization and other related items about FTU (now reorganized and recognized as "FTP") since the termination of the project

(1) Organization and staff allocation

- a Present Organization chart of SIRIM and its description with staff allocation**
- b Present Organization chart of FTU and its description with staff allocation**
- c Relations with other governmental organizations in Malaysia**

- (2) Function, placement and activities
 - a Function and placement of SIRIM in Malaysia
 - b Placement of FTU in SIRIM
 - c Function of FTU in the Seventh Malaysian Plan 1996-2000
 - d Basic guidelines of activities of FTU
 - e Number of activities of FTU for support and assistance to local foundries from Malaysian fiscal year 1993 to 1997 and the detail
 - * Please fill in the attached documents (Appendix 06).
 - f Present positions and activities of the former counterpart personnel of the Project.
 - * Please fill in the attached documents (Appendix 07)
 - g Relations with other bi-lateral and multi-lateral aid agencies, which has assisted, assist and will assist

- (3) Budgetary condition.
 - a Settlement accounts from Malaysian fiscal year 1993 to 1997
 - * Please fill in the attached documents (Appendix 08).
 - b Budget from Malaysian fiscal year 1998 to 2000
 - * Please fill in the attached documents (Appendix 08).
 - c Allocation of the budget for local cost expenses for the implementation of the Aftercare Programme
 - * Please fill in the attached documents (Appendix 08).
 - d Main equipments provided by the Malaysian side from 1993 to 1997 and main plan of installing new equipments by the Malaysian side from 1998 to 2000
 - * Please fill in the attached documents (Appendix 09).

3. Other relevant information

APPENDIX 01

PRESENT CONDITION OF MACHINERY AND EQUIPMENT PROVIDED BY JAPAN

No	Name	Specification	Maker	Date of Provision	Operation(*1) problems if any	Maintenance(*2) problems if any	Remarks

(*1) A: Operation: many times in effective
 B: Operation: a few times in effective
 C: Operation: no time since the termination

(*2) A: Maintenance: good
 B: Maintenance: necessary to repair (operation now)
 C: Maintenance: necessary to repair (stopping now)

APPENDIX 02

NECESSITY OF REPAIR, SPARE PARTS AND CONSUMABLES OF MACHINERY AND EQUIPMENT PROVIDED BY JAPAN

No	Name	Necessity of repair(*3) and the detail	Necessity of spare parts and consumables (*3) and the detail	Availability of spare parts and consumables in Malaysia (*4) and the quotations	REMARKS(*5)
(*3) A: Must B: Necessary C: If possible		(*4) A: Available B: Not available		(*5) any relation with supplementary technical cooperation (appendix03,04)	

APPENDIX 04

**LIST OF THE MACHINERY AND EQUIPMENT NEEDED TO BE PROVIDED
ON THE THEME No.**

1. Name of machinery and equipments: _____

(PRIORITY: A: MUST B: NECESSARY C: IF POSSIBLE)

2. Quantity

3. Specification

4. Maker (Price unit ¥1,000)

5. Reasons of necessity

6. Availability in Malaysia and the quotation

APPENDIX 06

1. NUMBER OF ACTIVITIES OF FTU FOR SUPPORT AND ASSISTANCE TO LOCAL FOUNDRIES

	1993	1994	1995	1996	1997
Visit to local foundries					
Test and Inspection Services					
Information Services					
Products of Development					
Seminars					
Contest					

2. DETAIL

(1) Visit to local foundries

(2) Test and Inspection Services

(3) Information Services

(4) Products of Development

(5) Seminars

(6) Contest

APPENDIX 07

LIST OF FORMER COUNTERPART PERSONNEL OF THE PROJECT, THEIR PRESENT POSITION AND ACTIVITIES

NO	NAME	AGE	SEX	PRESENT POSITION	PRESENT ACTIVITIES	REMARKS

APPENDIX 08

BUDGETARY CONDITION OF FTU FOR THE IMPLEMENTATION OF THE AFTERCARE PROGRAMME

- a. Settlement Accounts from 1993 Malaysian fiscal year to 1997

	M\$				
	1993	1994	1995	1996	1997
Development Budget					
Operating Budget					
Total					

- b. Budget from 1998 Malaysian fiscal year to 2000

	M\$		
	1998	1999	2000
Development Budget			
Operating Budget			
Total			

- c. Perspective of defrayal of local cost expenses for the implementation of the Aftercare Programme by FTU

(a) expenses for the internal transportation for the machinery and equipment to be provided by Japan

M\$ _____

(b) expenses for the supply of the machinery, the equipment and other materials necessary for the Aftercare Programme other than provided by Japan.

M\$ _____

(c) all the other running expenses for the Aftercare Programme

M\$ _____

APPENDIX 09

MAIN EQUIPMENTS PROVIDED AND MAIN PLAN OF INSTALLING NEW EQUIPMENTS BY MALAYSIAN SIDE

Date of Provision	Name	Specification	Maker	Operation(*1) problems if any	Maintenance(*2) problems if any	Remarks

(*1) A: Operation: many times in effective
 B: Operation: a few times in effective
 C: Operation: no time since the termination

(*2) A: Maintenance: good
 B: Maintenance: necessary to repair (operation now)
 C: Maintenance: necessary to repair (stopping now)



- MPTC(3081)/18/1
- 22 January 1998

Resident Representative
Japan International Cooperation Agency
Suite 18.1W, 18th. Floor
Wisma Sime Darby
Jalan Raja Laut
50350 Kuala Lumpur
(Att. : Mr. Taisuke Watanabe)

Dear Sir,

**AFTERCARE PROGRAMME ON THE TECHNICAL COOPERATION
PROGRAMME FOR THE PROJECT ON FOUNDRY TECHNOLOGY UNIT (FTU)
IN SIRIM**

With reference to above matter, attached herewith the questionnaire regarding of the project for your further action with JICA Headquarters in Tokyo.

Should you have any enquiry please do not hesitate to contact me at 03-556 6655 or fax 03-556 6673.

Thanking you in advance for your attention and cooperation.

Yours Sincerely,

(MOHD AKHIR YEOP KAMARUDDIN)
Coordinator
Foundry Technology Programme
Industrial and Engineering Design Centre

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**AFTERCARE PROGRAMME ON THE TECHNICAL COOPERATION
PROGRAMME FOR THE PROJECT ON
FOUNDRY TECHNOLOGY (FTU) IN SIRIM**

CONTENT OF THE AFTERCARE PROGRAMME

MACHINERY DONATED BY JAPANESE SIDE

List of equipment donated by the Japanese side as shown in Appendix 1. Most of the machineries are still in a good condition.

Some of the equipment need repair or parts replacement due to age as shown in Appendix 2. Most of the equipment need to be repaired and their spare parts cannot be sourced in Malaysia.

SUPPLEMENTARY TECHNICAL COOPERATION

Since the completion of the Technical Cooperation Programme in 1993, supplementary technical cooperation by mean of the dispatch of short term experts are needed. This is especially to enhance further, review of the staffs knowledge and capability, besides training programme to the new staff of the Foundry Technology Programme. The requirement of short term experts are as in Appendix 3.

To support the programme, certain equipment and tools are needed to ensure the success of this technology transfer. Most of the equipment and tools for this purposes are not available in Malaysia, hence it need be procured in Japan. Appendix 4 listed the requirement.

In order for the programme run smoothly, Malaysian counterparts will be assigned to the short-term experts. The details as in Appendix 5.

ACTIVITIES OF FOUNDRY TECHNOLOGY PROGRAMME SINCE THE TERMINATION OF THE PROJECT

Present Organisation

SIRIM Berhad has been corporatised on 1 September 1996. The present organisation chart of SIRIM as in Appendix A. The present organisation chart of Foundry Technology Programme as in Appendix B.

SIRIM Berhad in Brief

SIRIM Berhad's vision is to be a world class corporation of choice for technology and quality. The missions are :

- to enhance customer's competitiveness through technology and quality
- to fulfill the needs of stakeholders

SIRIM Berhad, formerly known as the Standards and Industrial Research Institute of Malaysia, is a multi-disciplinary research and development government-owned company under the Minister of Finance Incorporated. The company came into operation upon its corporatisation on 1 September 1996. Its role are to act as :

- A champion of quality
- The national technology development corporation
- A vehicle for technology transfer
- A provider of institutional and technical infrastructure for the government.

The company's current research and technology development programmes are closely aligned with the national thrust areas which are strategically important for the country's technological and economic development. SIRIM Berhad focuses on three technology clusters :

- Advanced manufacturing
- Advanced materials
- Process technology

PLACEMENT OF FOUNDRY TECHNOLOGY PROGRAMME IN SIRIM

Foundry industry is very important in the industrialisation programme of the country. The enhancement programme is implementing under the Seventh Malaysia Plan (7MP) from 1996 - 2000. A more comprehensive Centre is to be developed under this Plan. Allocation of RM 31,200,000 has approved in principle by the Government of Malaysia for this purpose. RM 8,000,000 is estimated for the land and building; while RM 23,200,000 is allocated for machineries and equipment.

The following activities will be carried out by the Centre :

- R&D on process and casting products
- Pilot production of casting products and components
- Training for entrepreneurs and skill workers
- Engineering services such as heat-treatment, machining, evaluation and testing of materials and products
- Information gathering and dissemination
- International networking
- Advice and consultancy services

The activities carried out to support the foundries from 1993 - 1997 as shown by Appendix 6. At present the activities are implemented by 10 staffs comprising of 3 officers and 7 supporting staffs. The position of the staffs as shown in Appendix 7.

BUDGET ALLOCATION

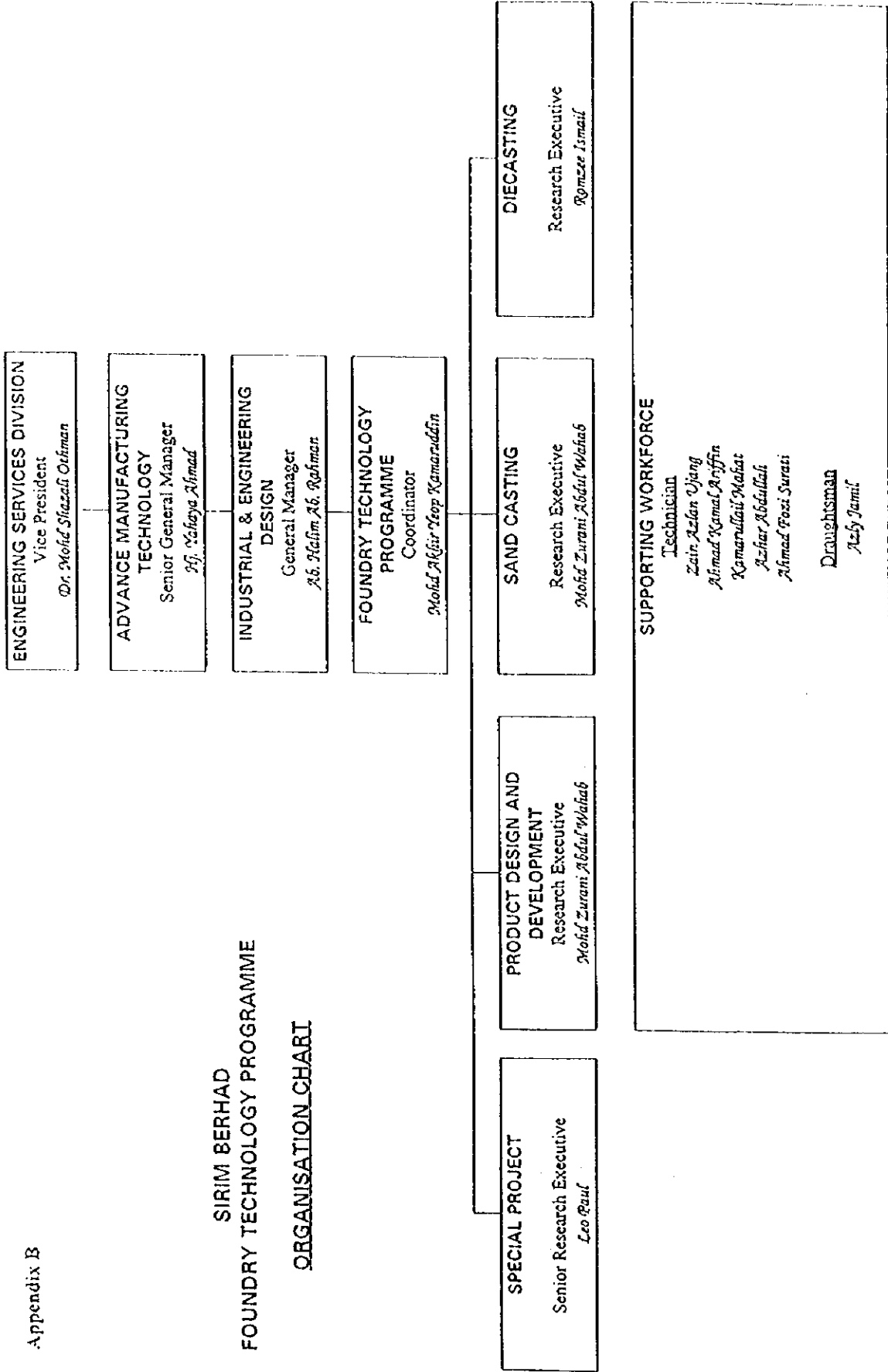
Appendix 8 shows the distribution of budget allocated to implement the foundry activities for 1993 to 1997, the future allocation principally approved for 1998 to 2000. Main equipment provided by the Malaysian side from 1993 to 1997 and main plan of installing new equipment by the Malaysian side from 1998 to 2000 shown by Appendix 9.

PROGRAMMES'S IMPLEMENTATION

The programme is proposed to be implemented during 1998 Japanese Fiscal Year. The proposed schedule is as in Appendix C.

SIRIM BERHAD
FOUNDRY TECHNOLOGY PROGRAMME

ORGANISATION CHART



Appendix C

AFTERCARE PROGRAMME FOR THE PROJECT ON FOUNDRY TECHNOLOGY UNIT (FTU) IN SIRIM
 ACTIVITIES SCHEDULE - PROPOSAL

No.	Activities	1998												1999		
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb			
1.	Survey Team	→														
2.	Maintenance and Inspection 1 (Moulding) - Theme 1		→→→→													
3.	Maintenance and Inspection 2 (Furnace) - Theme 2		→→→→													
4.	Maintenance and Inspection 3 (Spectrometer) - Theme 3		→→→→													
5.	Product Development Expert - Theme 4			→→→→→→→→												
6.	Pattern Making Expert - Theme 5							→→→→→→→→								
7.	Sand Reclamation Process - Theme 6							→→→→→→→→								
8.	Advance Materials for Casting Products - Theme 7				→→→→→→→→											

APPENDIX 01
PRESENT CONDITION OF MACHINERY AND EQUIPMENT PROVIDED BY JAPAN

No.	Name	Specification	Maker	Date of Provision	Operation (*) problems if any	Maintenance (**) problems if any	Remarks
1. MELTING							
1.1	500 kg Dura-Line Furnace with ring hood	500 kg.	Inductotherm	14/12/89	A	B	Need overall maintenance
1.2	100 kg Dura-Line Furnace with ring hood	100 kg	Inductotherm	14/12/89	A	B	"
1.3	#60 single push-out furnace	20 kg Al; 60 kg Cu	Inductotherm	14/12/89	A	B	"
1.4	Melting power supply 325 kW-3000 Hz VIP Power Trak	325 kW, 3000 Hz	Inductotherm	14/12/89	A	B	"
1.5	Hydraulic power supply	FM 2400	Daikin	14/12/89	A	B	"
1.6	Water cooled module			14/12/89	A	B	"
1.7	Transformer	3 kVA	Fuji	14/12/89	A	A	
1.8	Dust collector	LYDC - 64 PR	Sinto	07/12/89	A	A	
1.9	Floor scale Model No. : DJ-2	50 kg	Yamato	12/08/89	A	A	
1.10	Geared crane ladle Model NIG-600			12/08/89	A	A	
1.11	Geared crane ladle Model NIG-100			12/08/89	A	A	
1.12	Geared crane ladle Model NIG-50			12/08/89	A	A	
1.13	Gas Burner Model TMG-GB-L-D with stand	DS 1004	Eolus Blower	12/08/89	A	B	Pressure gauge and spark igniter need replacement
1.14	Overhead hoist crane	5 ton	Wagon		A	A	
1.15	Fork lift car Model 743 c/w std. equipment	590 kg	Bobcat	31/03/89	A	A	
1.16	Recorder Model S701-86(LR 8100)		Yokogawa	06/02/92	A	A	
1.17	Heat resistance wireless crane scale capacity 1000 kg	1000 kg	Shuzui	06/02/92	A	A	
1.18	Generator Model DCA-4SSPI	415 V; 50/60 Hz; 3 phase; 37 kVA	Isuzu	24/05/89	A	A	
2. MOULDING							
2.1	Jolt squeeze stripper moulding machine	Table size : 575 x 650 mm	Sinto	07/12/89	A	A	
2.2	Roller conveyor HH type (parallel)	300 mm (W) x 3000 mm (L)	Sinto	12/08/89	A	A	
2.3	Moulding flasks - 3 sets	1000 x 800 x 300/250 mm		19/10/89	A	A	
2.4	Moulding flasks - 5 sets	580 x 460 x 250/250 mm		19/10/89	A	A	
2.5	Moulding flasks - 10 sets	300 x 240 x 200/200 mm		19/10/89	A	A	
2.6	Air rammer Model FR - 0, FR - 0L			12/08/89	A	A	

No.	Name	Specification	Maker	Date of Provision	Operation (*1) problems if any	Maintenance (*2) problems if any	Remarks
2.7	Moulding flask - 3 sets	580 x 460 x 250/250 mm		30/03/91	A	A	
2.8	Abrasive cutter No 95-C1800-400			30/03/91	A	A	
2.9	Green sand conveying system	120 kg/batch	Local made	26/10/91	A	A	
2.10	Moulding flask - 2 sets	580 x 460 x 250/250 mm		30/12/92	A	A	
3. CORE MAKING							
3.1	Core blowing machine (SBO-5C) super blow	Air pressure : 5.6 - 7.0 kg/cm ²	Sinto	06/12/89	A	A	
3.2	Shell moulding machine type TD-330	Blow head : 3.5 kg	Toyo	06/12/89	C	A	
3.3	Core box for core blowing machine	310 x 400 x 340 mm		19/10/89	C	A	
3.4	Core box for core blowing machine	500 x 300 x (70 → 70)		19/10/89	C	A	
4. SAND PREPARATION							
4.1	CO ₂ self-setting sand plant bucket elevator (with frate hopper)		Sinto	06/12/89	A	A	
4.2	Sand hopper with belt conveyor	Capacity : 5 m ³	Sinto	06/12/89	A	A	
4.3	Mixer control panel	Control system - relay	Sinto	06/12/89	A	A	
4.4	Dust collector	300 mm Aq	Sinto	06/12/89	A	A	
4.5	Green sand plant shake out machine (with hood)	Grate : 150 x 920 mm; max load : 0.3 ton	Sinto	06/12/89	A	A	
4.6	Belt conveyor (with magnet pulley and magnet separator)	4.0 kW; belt speed 90 m/min 1.5KW	Nippon Magnetic Dressing Co. Ltd	06/12/89	A	A	
4.7	Bucket elevator		Sinto	06/12/89	A	A	
4.8	Sand hopper belt conveyor	20 ton/hr	Sinto	06/12/89	A	A	
4.9	Mixer (with turn conveyor) control panel	120 kg/batch	Sinto	06/12/89	A	B	Contactor need replacement
4.10	Dust collector		Sinto	06/12/89	A	B	Contactor need replacement
4.11	Sand dryer	Vertical type	Masuno Seisakusho	15/01/90	C	A	
4.12	Power heater	Gas & kerosene		15/01/90	A	A	
4.13	Hot air generator	Oil : 0.5 kg/cm ²		15/01/90	A	A	
4.14	Main control box	415V, 50 Hz		15/01/90	A	A	

No.	Name	Specification	Maker	Date of Provision	Operation (*1) problems if any	Maintenance (*2) problems if any	Remarks
4.15	Bag filter	Cylindrical	Sinto Ultra Jet	15/01/90	A	A	
5.	FINISHING						
5.1	Shot blast machine	50 kg capacity	Sinto	06/12/89	A	A	
5.2	Double head grinder Model MWG-20	510 mm dia. 415V/3 phase/50 Hz	Matsuzaki	12/08/89	A	A	
5.3	Vertical bandsawing machine Model VM-1200		Jonan Seisakusho	30/03/91	A	B	Clamping, laser need replacement
5.4	Circular table Daiwa Koki TCT - 300		Daiwa	15/10/90	C	A	
5.5	Air compressor Model KST15A-5C	2.4 m ³ /min compressed air ; 415V/3 ph/50 Hz	Kobelco	12/08/89	A	B	
6.	TEST & INSPECTION						
6.1	Fully automated X-Ray Fluorescence Spectrometer	Sytem 3070E, Serial : LR 12030	Rigaku	10/11/89	A	B	X-ray tube need replacement
6.2	Carbon sulphur determinator Model CS 244	Model 244; Serial 2156	LECO	12/08/89	A	B	Maintenance by Malaysian side
6.3	Sample press Model Prestopress-3	Serial : 4410218	Struers	05/01/93	A	A	
6.4	C.E meter model : EH100-1		Chino	24/05/89	A	A	
6.5	Immersion pyrometer Model MSP-203(R)		Nisabu	24/05/89	C	C	Scrapped (replaced by 6.11)
6.6	Al Faith gas analyser Model : DP-MK II		Eikoh	24/05/89	C	A	
6.7	Digital thermometer		Chino	31/03/89	C	C	Beyond repair
6.8	Deep throat Brinell Hardness Tester Model AP-24-24		Wilson		A	A	
6.9	Ultrasonic Detector Model : ND-Tester-QTA		Kusaka Rare	02/01/91	C	A	
6.10	Inverted type metallurgical microscope Model : PEM3-313UN		Olympus	25/03/91	A	A	
6.11	Immersion pyrometer Model MSP-203(R)	0 °C - 1760 ° C	Nisabu	06/02/92	A	A	
6.12	Laboratory mix-muller Model MSF-OL	22.6 kg/batch	Sinto-Simpson	19/10/89	A	A	
6.13	Mixer Model : MSU-1	CO : 20 kg/batch; alpha-set : 30 kg/batch	Sinto	19/10/89	A	A	
6.14	Sand rammer for sand specimen Model : SR	50 mm x 50 mm dia.	Sinto	19/10/89	A	A	

No.	Name	Specification	Maker	Date of Provision	Operation (*1) problems if any	Maintenance (*2) problems if any	Remarks
6.15	Ro-Tap sieve shaker Model : SS with sand testing sieves Model STS	200 W; 1 ph.	Sinto	19/10/89	A	B	Sieves need replacement
6.16	Rotating sand washer Model : SW	35 W; 1 ph.	Sinto	19/10/89	A	A	
6.17	Permeability tester Model : PT	100 mm. Aq; 2000 cm ³ air	George Fischer	19/10/89	A	A	
6.18	Motor-driven universal sand strength machine Model US-M with US-A		Sinto	19/10/89	A	A	
6.19	Infrared moisture meter Model : F-2B	Infrared : 185 W x 3; 50 g. sample	Sinto	19/10/89	A	A	Spare infrared lamp is needed
6.20	Green hardness tester B scale 473		Sinto	19/10/89	A	A	
6.21	Core hardness tester No. 674		Sinto	19/10/89	A	A	
6.22	Methylene blue clay tester No. 535-A		George Fischer	19/10/89	A	A	
6.23	Mouldability tester with transformet. tray, brush & sieve		Takachinoseki Co. Ltd.	12/08/89	A	A	
6.24	Sand surface testing apparatus Model : POF		George Fischer	12/08/89	A	A	
6.25	Contactability Model : NS-CBT-2		George Fischer	24/05/89	A	A	
6.26	Universal strength machine Model : PFG with pressure gauge break jig		George Fischer	12/08/89	C	C	Will be replace by a new unit
6.27	Balance Model : FR-300	310 g x 0.1 mg	A&D Co. Ltd.	24/05/89	A	A	
6.28	Drying oven Model : DX-41	5 - 500 °C	Yamato Scientific	12/08/89	A	A	
6.29	Muffle furnace for electric oven		Isuzu	19/10/89	A	A	
6.30	CO ₂ gassing controller Model : PBC		Crown	12/08/89	A	A	
6.31	Surface thermometer Model HI-200		Anritsu Keiki	05/01/90	A	A	
6.32	Casting Intensity Meter		Nakayama	08/08/91	A	A	
6.33	Surface plate, stand		Pyramid	20/03/91	C	A	
6.34	Stereo Microscope		Carl Zeiss	27/03/91	B	A	
6.35	Transverse strength core box type PBK		Sinto	30/03/91	B	A	
6.36	Volatiles apparatus type PGA		George Fischer	30/03/91	A	B	Will be purchased by Malaysian side
6.37	Specimen dryer Model : 95-C4200-250		Buehler	30/03/91	A	A	
6.38	Specimen grinder Model 95-C2241-250		Buehler	30/03/91	A	A	
6.39	Universal polisher Model : 95-C2441-250		Buehler	30/03/91	A	A	
6.40	High-dry compressive strength attachment		George Fischer	23/08/91	A	A	Attachment to 6.26
6.41	Electric balance Model : PJ 3000		Mettler	18/07/91	B	A	

No.	Name	Specification	Maker	Date of Provision	Operation (*)1) problems if any	Maintenance (*)2) problems if any	Remarks
6.42	Gas pressure determinator Model : PGD		George Fischer	02/01/91	B	B	Need rubber seal & recording paper
6.43	Ultrasonic cleaner with heater timer		Cole Palmer	23/08/91	B	A	
6.44	Vertical acrylic dessicator		Samplec Corp	23/08/91	A	B	Dehumidifier malfunction
6.45	Universal Testing Machine ; Model: UH-30B; S/No. : 3109752	30 toni.	Shimadzu	21/02/94	A	A	Necessary to upgrade with computer system
7.	PATTERN MAKING						
7.1	Thickness planer Model SX-633	Max. workable stock : 600 x 300 mm	Iida Kogyo Co. Ltd.	19/10/89	A	B	Sharpening of the cutting blade
7.2	Hand feed planer Model : EJ-302		Iida Kogyo Co. Ltd.	12/08/89	A	A	
7.3	Bandsaw Model : JBS-650	3.7 kW; 3 ph. ; 7 A	Jonan Seisakusho	24/05/89	A	B	Resetting of sawing blade
7.4	Universal drilling machine Model : EF-40		Yamamoto Co. Ltd.	12/08/89	A	A	
7.5	Woodworking lathe machine Model : TF-24	Spindle speed : 150 - 1400 rpm	Fujikyu Machinery Industry	12/08/89	A	A	
7.6	Angle vise w/swivel base Model : P-400AS		Mitutoyo	24/05/89	A	A	
7.7	Box parallel Model : BP19M		Mitutoyo	24/05/89	A	A	
7.8	Surface gauge Model : NY17-311		Mitutoyo	24/05/89	A	A	
7.9	Surface gauge Model : NY17-313		Mitutoyo	24/05/89	A	A	
7.10	Surface gauge Model : NY17-314		Mitutoyo	24/05/89	A	A	
7.11	Vernier caliper Model : NE 20		Penguin	24/05/89	A	A	
7.12	Vernier caliper Model : NE 30		Penguin	24/05/89	A	A	
7.13	Straight edge 1000 mm		Penguin	24/05/89	A	A	
7.14	Square Model : OA-150		Penguin	24/05/89	A	A	
7.15	Square Model : OA-300		Penguin	24/05/89	A	A	
7.16	Steel ruler - 300 mm	0 - 300 mm	-	24/05/89	A	A	
7.17	Steel ruler - 600 mm	0 - 600 mm	-	24/05/89	A	A	
7.18	Jack screw Model : No.5		-	24/05/89	A	A	
7.19	Jack screw Model : J45		-	24/05/89	A	A	

No.	Name	Specification	Maker	Date of Provision	Operation (*) problems if any	Maintenance (**) problems if any	Remarks
7.20	Surface plate Model : OS-6060		-	24/05/89	A	A	
7.21	Surface plate Model : OS-90180		-	24/05/89	A	A	
7.22	Router machine Model : RO-116	Max. thickness : 145 mm	Shoda	24/05/89	A	A	
7.23	Tilting saw spindle type circular saw bench Model : ISB-16	Work table : 1000 x 900 mm	Ishizu Mfg. Co. Ltd.	19/10/89	A	A	
7.24	Electric bench grinder Model : ABT-4 with floor stand	Grinding wheel : 255 mm dia.	Hitachi Koki	12/08/89	A	A	
7.25	Knife grinder Model : JG-T60		Takegawa Iron Co. Ltd.	24/05/89	A	A	
7.26	Plane, blade size : 3/4 - fine			14/12/89	A	A	
7.27	Plane, blade size : 3/4 - rough			14/12/89	A	A	
7.28	Plane, blade size : 3/4 - small			14/12/89	A	A	
7.29	Plane, blade size : 3/4 - long			14/12/89	A	A	
7.30	Double-edged wood saw - 300 mm			14/12/89	C	C	Broken
7.31	Double-edged wood saw - 240 mm			14/12/89	C	C	Broken
7.32	Mini plane - 40 mm			14/12/89	A	A	
7.33	Mini plane - 30 mm			14/12/89	A	A	
7.34	Side plane for left - 300 mm			14/12/89	A	A	
7.35	Side plane for right - 300 mm			14/12/89	A	A	
7.36	Triangle gimlet - regular			14/12/89	A	A	
7.37	Square gimlet - regular			14/12/89	A	A	
7.38	Jar gimlet - 9 mm			14/12/89	A	A	
7.39	Jar gimlet - 6 mm			14/12/89	A	A	
7.40	Wood chisel for flat - 30 mm			14/12/89	A	A	
7.41	Wood chisel for flat - 18 mm			14/12/89	A	A	
7.42	Wood chisel for flat - 9 mm			14/12/89	A	A	
7.43	Wood chisel for round - 3.5 mm			14/12/89	A	A	
7.44	Wood chisel for round - 3.7 mm			14/12/89	A	A	
7.45	Small tools with covered knives			14/12/89	A	A	
7.46	Whet stone for round chisel, medium			14/12/89	A	A	
7.47	Whet stone for round chisel, fine			14/12/89	A	A	

No.	Name	Specification	Maker	Date of Provision	Operation (*1) problems if any	Maintenance (*2) problems if any	Remarks
7.48	Bush hammer, weight : 300 g			14/12/89	A	A	
7.49	Bush hammer, weight : 115 g			14/12/89	A	A	
7.50	Wood chisels for flat - 10 pcs/set			14/12/89	A	A	
7.51	Wood chisels for round - 10 pcs/set			14/12/89	A	A	
7.52	Wood chisels for flat with handle			14/12/89	A	A	
7.53	Wood chisels for convex with handle			14/12/89	A	A	
7.54	Steel back plate			14/12/89	A	A	
7.55	Emery powder			14/12/89	A	A	
7.56	Whet stone - fine			14/12/89	A	A	
7.57	Whet stone - medium			14/12/89	A	A	
7.58	Whet stone - rough			14/12/89	A	A	
7.59	Knives			14/12/89	A	A	
7.60	Bag filter dust collector Model : NDC-750P	80 m ³ /min, 415V/5.5kW	Nippon Dust Collector	12/08/89	A	A	
7.61	Portable bandsaw Model : BSW-200		Ryowa	21/03/90	C	C	Belting and cutting blade need replacement
7.62	Set square			05/01/90	A	A	
7.63	Compass 75, 125, 250			05/01/90	A	A	
7.64	Surface gauge 250, 400			05/01/90	A	A	
7.65	Chisel & clamp - 300 mm			05/01/90	A	A	
7.66	Marking gauge			05/01/90	A	A	
7.67	Bits (10 pcs/set)			05/01/90	A	A	
7.68	Plane (10 set)			05/01/90	A	A	
7.69	Hand saw			05/01/90	A	A	
7.70	Flat curve edge with handle (10 set)			05/01/90	A	A	
7.71	Precision squares levels - 200 x 130 mm			05/01/90	A	A	
7.72	Bevel ruler - 150 mm			05/01/90	A	A	
7.73	Graduator			05/01/90	A	A	
7.74	Vernier caliper : 0 - 150 mm		Mitutoyo	08/02/91	A	A	
7.75	Vernier caliper : 0 - 300 mm		Mitutoyo	08/02/91	A	A	
7.76	Digimatic height gauge : 0 - 600 mm		Mitutoyo	21/03/91	A	A	
7.77	Vernier depth gauge (S27-201) : 0 - 150 mm		Mitutoyo	21/03/91	A	A	

No.	Name	Specification	Maker	Date of Provision	Operation (*1) problems if any	Maintenance (*2) problems if any	Remarks
7.78	Vernier depth gauge (527-103) : 0 - 300 mm		Mitutoyo	21/03/91	A	A	
7.79	4 gauge block set (112 pcs)		Mitutoyo	27/03/91	A	A	
7.80	Vernier height gauge (506-201) : 0 - 150 mm		Mitutoyo	23/08/91	A	A	
7.81	Vernier height gauge (506-201) : 0 - 500 mm		Mitutoyo	23/08/91	A	A	
7.82	Vernier caliper (160-128) : 0 - 450 mm		Mitutoyo	23/08/91	A	A	
7.83	Whetstone No. 100 (red)			10/12/91	A	A	
7.84	Whetstone S-1			10/12/91	A	A	
7.85	Oil whetstone			10/12/91	A	A	
7.86	Knife			10/12/91	A	A	
7.87	Chisel (10 pcs/set)			10/12/91	A	A	
7.88	Marking gauge			10/12/91	A	A	
7.89	Stretch gauge : 500 mm			10/12/91	A	A	
7.99	Stretch gauge : 700 mm			10/12/91	A	A	
7.100	Graver (4 pcs/set)			10/12/91	A	A	
7.101	Micro protractor : MP-101		Marui-Keiki	10/12/91	A	A	
7.102	Angle plate : AGD-1			10/12/91	A	A	
7.103	Tohsukan 400 -500 high			10/12/91	A	A	
7.104	Scale stand			10/12/91	A	A	
7.105	Automatic driver : 1500-240			10/12/91	A	A	
7.106	Wooden screw driver : 1.6 - 2.4 mm			10/12/91	A	A	
7.107	Radius gauge : 178 MAA (0.1 - 1 mm)		Fuji Tool	10/12/91	A	A	
7.108	Radius gauge : 178 MA (1 - 7 mm)		Fuji Tool	10/12/91	A	A	
7.109	Radius gauge : 178 MB (7.5 - 15 mm)		Fuji Tool	10/12/91	A	A	
7.110	Compass for wooden : SC 75			10/12/91	A	A	
7.111	Compass for wooden : SK 100			10/12/91	A	A	
7.112	Compass for wooden : SK 125			10/12/91	A	A	
7.113	Compass for wooden : SK 150			10/12/91	A	A	
7.114	Compass for wooden : SK 250			10/12/91	A	A	
7.115	Angle gauge No. 466 (1-45°) - 18 pcs/set			10/12/91	A	A	
7.116	Casting side calipers : 8/1000 x 300 mm		Kanon	05/03/91	A	A	
7.117	Casting side calipers : 10/1000 x 300 mm		Kanon	05/03/91	A	A	

No.	Name	Specification	Maker	Date of Provision	Operation (*1) problems if any	Maintenance (*2) problems if any	Remarks
7.118	Casting side calipers : 15/1000 x 300 mm		Kanon	05/03/91	A	A	
7.119	Casting side calipers : 25/1000 x 300 mm		Kanon	05/03/91	A	A	
7.120	Casting rule : 1 - 8/1000 x 300 mm		Kanon	05/03/91	A	A	
7.121	Casting rule : 1 - 10/1000 x 300 mm		Kanon	05/03/91	A	A	
7.122	Casting rule : 1 - 15/1000 x 300 mm		Kanon	05/03/91	A	A	
7.123	Casting rule : 1 - 20/1000 x 300 mm		Kanon	05/03/91	A	A	
7.124	Depth gauge vernier caliper : SM 15 : 150 mm x 0.02		Kanon	02/01/91	A	A	
7.125	Depth gauge vernier caliper : SM 30 : 300 mm x 0.02		Kanon		A	A	
7.126	Bader Machine Model : BMA	415V/3 ph		02/01/91	A	A	
7.127	Bend plane size : R 50 - 300 mm (9 pcs/set)			02/01/91	A	A	
7.128	Cross bend plane size : R 5 - 50 mm; 50 - 300 mm (8 pcs/set)			02/01/91	A	A	
7.129	Wood Vise Model : WS-10			02/01/91	A	A	
7.130	Screw centre jack No. 7 : 35 x 75 mm			02/01/91	A	A	
7.131	Screw centre jack No. 9 : 77 x 110 mm			02/01/91	A	A	
7.132	Screw centre jack No. 10 : 100 x 150 mm			02/01/91	A	A	
7.133	L-clamp : 300 x 140 mm (6 pcs)		Bessey	02/01/91	A	A	
7.134	L-clamp : 250 x 120 mm (6 pcs)		Bessey	02/01/91	A	A	
7.135	L-clamp : 200 x 100 mm (6 pcs)		Bessey	02/01/91	A	A	
7.136	L-clamp : 160 x 80 mm (6 pcs)		Bessey	02/01/91	A	A	
7.137	L-clamp : 120 x 60 mm (6 pcs)		Bessey	02/01/91	A	A	
7.138	Wood small cutting machine Model T-21			02/01/91	A	A	
7.139	Tool bit holder stand			02/01/91	A	A	
7.140	Tool bit holder			02/01/91	A	A	
7.141	Steel straight edge : 1000 x 50 x 6 mm			02/01/91	A	A	
7.142	Wood chisel - flat type (10 pcs)			02/01/91	A	A	
7.143	Wood chisel - round type (10 pcs)			02/01/91	A	A	
7.144	Engraver chisel - flat type (10 pcs)			02/01/91	A	A	
7.145	Engraver chisel - round type (10 pcs)			02/01/91	A	A	
7.146	Scoop-up chisel (10 pcs)			02/01/91	A	A	
7.147	Pool round plane (10 pcs)			02/01/91	A	A	

No.	Name	Specification	Maker	Date of Provision	Operation (*1) problems if any	Maintenance (*2) problems if any	Remarks
7.148	Side plane (each 1 pc of Right (24 mm) & Left (24 mm))			02/01/91	A	A	
7.149	Small plane : Large (42 mm); Medium (30 mm); Small (18 mm)			02/01/91	A	A	

(*1) A : Operation : many times in effective
 B : Operation : a few times in effective
 C : Operation : no time since the termination

(*2) A : Maintenance : good
 B : Maintenance : necessary to repair (operation now)
 C : Maintenance : necessary to repair (stopping now)

APPENDIX 02
NECESSITY OF REPAIR, SPARE PARTS AND CONSUMABLES OF MACHINERY AND EQUIPMENT PROVIDED BY JAPAN

No.	Name	Necessity of repair (*3) and the detail	Necessity of spare parts and consumables (*3) and the detail	Availability of spare parts and consumables in Malaysia (*4) and the quotations	Remarks (*5)
	MOULDING				
1.	Guide pin for pattern plate and flask		A	B	50 pcs is needed
2.	Operating valve for joint squeeze moulding machine		A	B	2 units needed for two machines
3.	Aluminium bottom plate for medium flask 525 x 625 x 10 mm		B	B	10 pcs needed
4.	Aluminium bottom plate for large flask 1900 x 880 x 12 mm		B	B	2 pcs needed
5.	AC magnetic contactor (AC 600V) for dust collectors		A	A	5 pcs needed
	SAND TESTING				
6.	Sand testing sieves (model STS) for Ro-Tap sieve shaker		A	B	
7.	Dry permeability cylinder (model : PT)		A	B	
8.	Infrared lamp model F2D for infrared moisture meter		A	B	

No.	Name	Necessity of repair (*3) and the detail	Necessity of spare parts and consumables (*3) and the detail	Availability of spare parts and consumables in Malaysia (*4) and the quotations	Remarks (*5)
9.	Universal strength machine piston model PFG	A	A		
10.	Gas determinator seal type PGD		A	B	
11.	RIGAKU X-RAY FLUORESCENCE SPECTROMETER (XRF) MODEL 3070E				Need general service of the XRF including the recalibration and readjustment, etc..
11.1	Service of the XRF	A		A	
11.2	X-Ray tube (end window type - sealed-off X-ray tube)		A	B	
11.3	F-PC window		A	B	5770W7; 6ECB; 958230B
11.4	Analyzing chamber window		A	B	Polyester film Cat. No. 3373B1
11.5	Fonbrin Grease		A	B	
11.6	Silicon grease for cables (KS-64)		A	B	
11.7	High voltage insulating oil (Nisseiki No. 1)		A	B	
11.8	Rotary pump oil		A	B	Type MR 200 and MR 100

No.	Name	Necessity of repair (*3) and the detail	Necessity of spare parts and consumables (*3) and the detail	Availability of spare parts and consumables in Malaysia (*4) and the quotations	Remarks (*5)
12.	HEAT EXCHANGER				
12.1	Ion exchange resins typ A and type B		A	A	A: IRA-410 (OH) : 2 B: IR-120B (H) : 1
12.2	Filter element		A	B	YF250E (2.5 μ)
13.	Carbon sulphur determinator Model CS 244	A		A	Need general maintenance (preventive)
14.	<u>MELTING</u> Pressure gauge and spark igniter for gas burner (preheater) model TMG-GB-L-D		A	B	
15.	Inductoform High Frequency Induction Furnace Syatem	B		A	Need service, recalibration, readjustment, etc.
16.1	Farrad fuse 800 A for Control panel		A	B	
17.	<u>FINISHING</u> Workpiece clamping for vertical bandsawing machine model VM-1200		A	B	

No.	Name	Necessity of repair (*3) and the detail	Necessity of spare parts and consumables (*3) and the detail	Availability of spare parts and consumables in Malaysia (*4) and the quotations	Remarks (*5)
18.	Laser system for vertical bandsawing machine model VM-1200		A	B	
19.	PATTERN MAKING Thickness planer Model SX-633 - Iida Kogyo Co. Ltd.		A	B	Blade need replacement since we can't get it locally
20.	Bandsaw Model JBS-650 : Jonan Seisakusho		A	B	Blade need replacement since we can't get it locally
21.	Double-edged wood saw - 300 mm		A	B	
22.	Double-edged wood saw - 240 mm		A	B	

(*3) A : Must
B : Necessary
C : If possible

(*4) A : Available
B : Not Available

(*5) Any relation with supplementary technical cooperation (Appendix 03,04)



QES (KUALA LUMPUR) SDN BHD

(Company no: 405481-D)

No 16, USJ 9/3F, UEP Subang Jaya 47620 Petaling Jaya,
Selangor DE, Malaysia

Tel : (603) 7335612 Fax : (603) 733 5432

We specialise in Quality Engineering Systems Kuala Lumpur • Penang • Singapore • Bangkok

Our ref : SRG81SIRIM,K1

Date : 21 January 1998

SIRIM BERHAD.

No. 1, Persiaran Dato' Menteri,
P.O.Box 7035, Section 2,
40911 Shah Alam.

Tel: 03-5566655, 5566663

Fax: 03-5566673 / 5566669

Attention : Purchasing Dept.
C.C : Mr. Mohd Akhir Yeop Kamaruddin

RE : QUOTATION ON SPARE PARTS FOR RIGAKU 3070E FLUORESCENT SPECTROMETER.

With reference to the above mentioned, we are pleased to quote you the following items in terms and conditions :

Price : Net delivery, in RM.
Payment : within 30 days from date of invoice
Delivery : 4 to 12 weeks upon receive of official P/O
Validity : Quotation Valid for 7 days.

We hope you find our attached quotation favorable and able to meet your requirements. We look forward to receive your soonest confirmation.

Assuring you our best service and support, always. Thank you.

Your Sincerely
QES (KUALA LUMPUR) SDN. BHD.

KHOO YIH SHENG
Technical & Service Dept.

C.c : S.K.TAM, C.T.ONG

Our ref : SRG81SIRIM.K1

<u>Item</u>	<u>Description</u>	<u>Qty</u>	<u>Price In RM</u>
1	X-ray tube (end window type)	1	RM82,400.00
2	F-PC window (6770W7) *	1	3,870.00
	F-PC window (6770W8) *	1	4,940.00
3	Analyzing Chamber Window	1	213.00
4	Fobrin Grease	1	283.00
5	Silicon Grease KS-84	1	276.00
6	High Voltage Insulating Oil 100cc	1	71.00
7	Rotary Pump Oil MR200	1	672.00
	Rotary Pump Oil MR100	1	672.00
8	Ion exchange resin for type A and type B for heat exchanger	1	1,980.00
9	Head exchanger 4862A1	1	686.00
	Internal filter element	1	143.00
	External filter element	1	143.00
10	Round airfare(business class) Osaka-KL-Osaka	1	12,870.00
11	Labour charge per day	1	4,000.00
12	Living expenses per day	1	800.00
Sub total			RM93,355.00

Note: The minimum labour and living expenses per trip is 3 days. It takes approximately 2 days to complete a PM job. Any spare part(s) changed will be charged accordingly.
: * Please choose accordingly to your requirement.

SYARIKAT LIMMET

83A, Jalan SS 21/37, Damansara Utama,
47400 Petaling Jaya, Malaysia.

Tel: 603-7191228, 7174071
Facsimile: 603-7172404.

FACSIMILE TRANSMISSION

TO S.L.R.I.M. Shah Alam FROM: Francis Lim
ATTN: Encik Zain Bin Azlan OUR REF: 0023
PAGE: 1 of 1 DATE: 20 January 1998

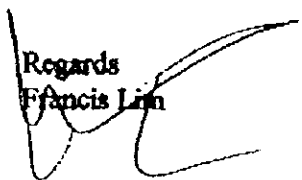
RE: SERVICE AND CHECK-UP OF 325KW 3000HZ UNIT

Further to your above enquiry, we are pleased to quote as follows :-

Total service and check-up of furnace for
2 days inclusive of return airfare
(Melbourne - Kuala Lumpur) US\$5,300.00

Note : We have quoted the above price in USDollars but will take a Malaysian Ringgit equivalent to be calculated at time of order.

to
Regards
Francis Lim



THEMES WHICH NEED SUPPLEMENTARY TECHNICAL COOPERATION BY THE JAPANESE SHORT-TERM EXPERTS.

1. Fields of the Japanese experts : Maintenance and Inspection 1
2. Period of Training : From Apr 1998 to _____ (1 months)
3. Detail Subjects of Guidance by Experts :
 - a) Maintenance green sand plant comprising of : mixer, belt conveyor, bucket elevator, magnetic separator, dust collector, etc..
 - b) Maintenance of CO₂ plant comprising of : mixer, belt conveyor, etc..
 - c) Maintenance of jolt & squeeze moulding machine.
4. Persons the Guidance by a Expert are aimed at :
 - a) Mr. Ahmad Kamal Ariffin
 - b) Mr. Ahmad Fozi Surati
5. Qualification required of Experts :

Experienced Service Engineer capable to perform the maintenance on the green sand plant, CO₂ plant and the jolt and squeeze moulding machine.

THEMES WHICH NEED SUPPLEMENTARY TECHNICAL COOPERATION BY THE JAPANESE SHORT-TERM EXPERTS.

1. Fields of the Japanese experts : **Maintenance and Inspection 2**
2. Period of Training : From April 1998 to _____ (1 months)
3. Detail Subjects of Guidance by Experts :
 - a) Maintenance of high frequency induction furnace - Inductotherm VIP Powertrak
 - b) Maintenance of accessory to the system such as duct collector, hydraulic system, cooling system, etc..
4. Persons the Guidance by a Expert are aimed at :
 - a) Mr. Zain Azlan Ujang
 - b) Mr. Kamarullail Mahad
5. Qualification required of Experts :

Experienced Service Engineer capable to perform the maintenance on the VIP Powertrak Inductotherm induction furnace and its accessories.

THEMES WHICH NEED SUPPLEMENTARY TECHNICAL COOPERATION BY THE JAPANESE SHORT-TERM EXPERTS.

1. Fields of the Japanese experts : **Maintenance and Inspection 3**
2. Period of Training : From April 1998 to _____ (1 months)
3. Detail Subjects of Guidance by Experts :
 - a) Maintenance of Rigaku X-Ray Fluorescent Spectrometer Model 3070E.
 - b) Maintenance of accessory to the system such as dust collector, heat exchanger, etc..
4. Persons the Guidance by a Expert are aimed at :
 - a) Mr. Azhar Abdullah
5. Qualification required of Experts :

Experienced Service Engineer capable to perform the maintenance on the Rigaku X-Ray Fluorescent Spectrometer and its accessories.

THEMES WHICH NEED SUPPLEMENTARY TECHNICAL COOPERATION BY THE JAPANESE SHORT-TERM EXPERTS.

1. Fields of the Japanese experts : **Product Development**
2. Period of Training : From May 1998 to July 1998 (3 months)
3. Detail Subjects of Guidance by Experts :
 - Casting design of complicated shape of steel, iron and non-ferrous castings comprising of casting drawing, product drawing, pattern drawing, etc..
4. Persons the Guidance by a Expert are aimed at :
 - a) Mr. Mohd Zurani Abdul Wahab
 - b) Mr. Azly Jamil
5. Qualification required of Experts :

The Expert should possess wide experience in product development of casting with the capability of handling ACAD.

THEMES WHICH NEED SUPPLEMENTARY TECHNICAL COOPERATION BY THE JAPANESE SHORT-TERM EXPERTS.

1. Fields of the Japanese experts : **Pattern Making**

2. Period of Training : From August 1998 to January 1999 (6 months)

3. Detail Subjects of Guidance by Experts :
 - Application and maintenance of tools and equipment
 - Techniques of pattern making for various complicated shapes and types of casting
 - Casting plan
 - Countermeasures

4. Persons the Guidance by a Expert are aimed at :
 - a) Mr. Mohd Zurani Abdul Wahab
 - b) Mr. Azly Jamil

5. Qualification required of Experts :

Highly skilled pattern maker capable to understand and transfer the pattern making techniques.

THEMES WHICH NEED SUPPLEMENTARY TECHNICAL COOPERATION BY THE JAPANESE SHORT-TERM EXPERTS.

1. Fields of the Japanese experts : **Sand Reclamation Process**
2. Period of Training : From August 1998 to October 1998 (3 months)
3. Detail Subjects of Guidance by Experts :
 - a) The process of reclaim used sand (from self-setting and CO₂ mould)
 - b) Process control of sand properties after reclaimed.
 - c) Formulation of moulding sand using reclaimed sand.
4. Persons the Guidance by a Expert are aimed at :

Mr. Ahmad Kamal Ariffin

Mr. Ahmad Fozi Surati.
5. Qualification required of Experts :

Experienced in sand reclamation and moulding.

THEMES WHICH NEED SUPPLEMENTARY TECHNICAL COOPERATION BY THE JAPANESE SHORT-TERM EXPERTS.

1. Fields of the Japanese experts : **Advanced Material for Casting Products**
2. Period of Training : From June 1998 to November 1998 (6 months)
3. Detail Subjects of Guidance by Experts :
 - Alloy design
 - Post treatment comprising of heat treatment, macjining, etc.

The materials should be used in specific application or environment such as high-temperature, corrosive, etc.

4. Persons the Guidance by a Expert are aimed at :
 - Mr. Leo Paul
 - Mr. Mohd Zurani Abdul Wahab, Research Executive
 - Foundry Technology Programme Staffs

5. Qualification required of Experts :

Experienced in the development of casting materials for special applications.

APPENDIX 05

LIST OF MALAYSIAN COUNTERPART PERSONNEL FOR THE AFTERCARE PROGRAMME

No.	Name	Age	Sex	Present Position	Qualification	Remarks
1.	Mohd Akhir Yeop Kamaruddin	40	M	Programme Coordinator	B.Sc. Mech. Eng.	Has been with FTP since 1988
2.	Romzee Ismail	30	M	Researcher	B.Sc. Mech. Eng.	Will complete M.Sc. by Sept. 98.
2.	Mohd Zurani Abdul Wahab	27	M	Researcher	B.Sc. Mech. Eng.	Has been with FTP since 1995
3.	Zain Azlan Ujang	40	M	Senior Technician	Cert. in Mech. Eng.	Has been with FTP since 1988
4.	Azhar Abdullah	32	M	Technician	B.Sc. Mech. Eng.	Has been with FTP since 1988
5.	Kamarullail Mahad	31	M	Technician	Cert. in Mech. Eng.	Has been with FTP since 1988
6.	Ahmad Kamal Ariffin	32	M	Technician	Cert. in Mech. Eng.	Has been with FTP since 1988
7.	Ahmad Fozi Surati	27	M	Technician	Cert. in Mech. Eng.	Has been with FTP since 1991
8.	Azly Jamil	25	M	Draughtsman	Cert. of Education	Has been with FTP since 1994

APPENDIX 06

1. NUMBER OF ACTIVITIES OF FTU FOR SUPPORT AND ASSISTANCE TO LOCAL FOUNDRIES

	1993	1994	1995	1996	1997
Visit to local foundries	10	15	18	10	25
Test and Inspection Services	258	70	197	122	91
Product Development	7	4	6	11	12
Seminars	-	-	-	1	3
Contest	-	-	-	-	-

2. DETAIL

(1) Visit to local foundries

Visit to local foundries in 1997 to undertake a technology forecasting for the Government of Malaysia.

(2) Test and Inspection Services

Most of the services requested from the industries in the field of compositional analysis. Others; sand testing, mechanical testing and hardness testing.

(3) Information Services

Information services rendered : setting-up the foundry plant, application of standards, quality and productivity improvement, suitability and compatibility of materials.

(4) Product Development

Please refer the attached sheet.

(5) Seminars

Seminar on sand casting and die-casting.

(6) Contest

APPENDIX 07

LIST OF FORMER COUNTERPART PERSONNEL OF THE PROJECT, THEIR PRESENT POSITION AND ACTIVITIES

No.	Name	Age	Sex	Present Position	Present Activities	Remarks
1.	Helme Hashim	43	M	General Manager	Musteq Industries Sdn. Bhd.	Fabrication company
2.	Muhammad Fauzi Ismail	40	M	Deputy C.E.O	Permodalan Usahawan Nasional Berhad	Venture Capital Company
3.	Lee Lay Kuan	35	F	Assessor	SIRIM-QAS Sdn. Bhd.	SIRIM's subsidiary - for quality
4.	Mohd Faiz Eyub	32	M	Supervisor	Samsung Corning Sdn. Bhd.	Producer picture tubes
5.	Jamil Suleiman	41	M	Consultant	Q-Padu Sdn. Bhd.	Quality activities
6.	Mohd Yusoff Sopian	40	M	Executive Director	Focas Industries Sdn. Bhd.	Own company - manufacturing
7.	Rosli Hussain	40	M	Supervisor	Acuan Engineering Sdn. Bhd.	Manufacturing
8.	Mohd Radzi Harun	32	M	Technician	SIRIM Berhad East Coast Region	
9.	Hisham Mohd Aris	40	M	Technical Supervisor	Perusahaan Otomobil Elektrik Malaysia Berhad	Electric car manufacturer
10.	Azmaizam Hj. Mohd Zain	30	M	QC Manager	Suasa Unik Sdn. Bhd.	Ductile iron pipe manufacturer
11.	Nor Baha Kassim	32	M	Supervisor	Perusahaan Otomobil Elektrik Malaysia Berhad	Electric car manufacturer
12.	Rosman Iteng	30	M	QC Manager	PHN Sdn. Bhd.	Producer automotive components
13.	Hasnul Akmal Haron	30	M	Researcher	SIRIM Berhad - Electrotechnical	

APPENDIX 07 (Cont.)

14.	Karthiga Kumar Lechumanan	30	M	Technician		
15.	Mohd Akhir Yeop Kamaruddin	40	M	Coordinator	FTP, SIRIM Berhad	
16.	Romzee Ismail	32	M	Researcher	FTP, SIRIM Berhad	Further study - M.Sc.
17.	Zain Azlan Ujang	40	M	Senior Technician	FTP, SIRIM Berhad	
18.	Azhar Abdullah	32	M	Technician	FTP, SIRIM Berhad	
19.	Kamarullail Mahad	31	M	Technician	FTP, SIRIM Berhad	
20.	Ahmad Kamal Ariffin	32	M	Technician	FTP, SIRIM Berhad	
21.	Ahmad Fozi Surati	27	M	Technician	FTP, SIRIM Berhad	
22.	Inas Saidin	32	M	Technician	FTP, SIRIM Berhad	Further study - Diploma

APPENDIX 08

BUDGETARY CONDITION OF FTU THE IMPLEMENTATION OF THE AFTERCARE PROGRAMME

a. Settlement Accounts from 1993 Malaysian Fiscal Year to 1997

	(Ringgit Malaysia, RM)				
	1993	1994	1995	1996	1997
Development Budget	3,251,503	n.a.	n.a.	600,000	5,430,000
Operating Budget	281,998	69,000	76,250	30,500	267,000
Total	3,533,501	69,000	76,250	630,500	5,697,000

b. Budget from 1998 Malaysian fiscal year to 2000

	(Ringgit Malaysia, RM)		
	1998	1999	2000
Development Budget	6,300,000 [@]	11,130,000*	6,740,000*
Operating Budget	110,000	n.a.	n.a.
Total	6,410,000	11,130,000	6,740,000

Note : [@] Budget expecting to be approved.

* Planned budget to implement RAFEC

c. Perspective of defrayal of local cost expenses for the implementation of the Aftercare Programme by FTU

(a) expenses for the internal transportation for the machinery and equipment to be provided by Japan

Absorbed under (b) below.

(b) expenses for the supply of the machinery, the equipment and other materials necessary for the Aftercare Programme other than provided by Japan

MR 20,200,000 principally approved by the Government of Malaysia to implement the proposed Rasa Foundry & Engineering Centre (RAFEC) under Seventh Malaysia Plan (1996 - 2000)

(c) all other running expenses for the Aftercare Programme

APPENDIX 09

MAIN EQUIPMENT PROVIDED AND MAIN PLAN OF INSTALLING NEW EQUIPMENT BY MALAYSIAN SIDE (1993 - 1998)

Date of Provision	Name	Specification	Maker	Operation (*) Problems if any	Maintenance (*) problems if any	Remarks
1994	Lathe Machine		Run Master	B	A	
1995	Sand blasting machine		Cuyson Euroblast	B	A	For die-casting
1996	Computerised thermal analysis system		Melllab	B	A	
1996	Uninterruptible power supply		Merlin Gerin	A	A	For XRF
1996	Induction melting furnace	5 - 10 kg capacity	Ajax Magnethermic	B	A	For alloys development
1997	Trimming press		Toshiba			Expecting to be delivered in 1998
1997	Autoladling unit for diecasting machine		Toshiba			Expecting to be delivered in 1998

(*) A : Operation : many times in effective
 B : Operation : a few times in effective
 C : Operation : no time since the termination

(*) A : Maintenance : good
 B : Maintenance : necessary to repair (operation now)
 C : Maintenance : necessary to repair (stopping now)

Note : For 1998 -2000 the figures cannot be furnished at this particular moment due to the currency problem.

4 追加質問状及びその回答

Japan International Cooperation Agency (JICA)
Shinjuku Maynds Tower Bldg.
1-1, Yoyogi, 2-Chome
Shibuya-ku, Tokyo, 151, Japan

Tel: +81-3-5352-5304
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9 February 1998

Mr. Mohd Akhir Yeop Kamaruddin
Coordinator
Foundry Technology Program
Industrial & Engineering Design Centre
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40911 Shah Alam, MALAYSIA
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Fax: +603-5508095

Subject: Comments and questions about your answers to the questionnaire

Dear Mr. Mohd Akhir Yeop Kamaruddin,

Thank you very much for the answers to the questionnaire. The answers are helpful for the preparation of the Aftercare Study Team.

Now we have some comments and questions about your answers as follows;

1. The following three documents are not attached. So please send them.

- (1) Appendix A: Present organization chart of SIRIM Berhad
- (2) Appendix 4 : List of machineries and equipments for supplementary technical cooperation
- (3) The attached sheet in 2 (4) of Appendix 06: Detail of activities of product development

2. About the Centre for the development of foundry industry which is to be developed under the seventh Malaysian Plan;

- (1) Is this Centre same as the proposed Rosa Foundry and Engineering Centre referred in Appendix 08? (If not, what is the name of this Centre? And please answer the following terms (2) ~ (10) to each Centre.)
- (2) Relation with FTP
- (3) Year to open
- (4) Annual budget allocation (Development budget and Operating budget)
- (5) Budget allocation for the land and building
- (6) Budget allocation for machineries and equipments
- (7) List of machineries and equipments to be purchased
- (8) Location
- (9) Staff allocation
- (10) Organization chart

3. About reorganization of SIRIM;

- (1) Any change of function and activities of FFP after being reorganized as a public cooperation
- (2) Plan to change function and activities of FFP for self supporting accounting system

4. About Self-earning budget;

- (1) Amount of Self-earning budget from 1993 to 1997
- (2) Activities as the source of Self-earning budget
- (3) Usage of Self-earning budget

5. About dispatching Short-term expert;

- (1) Priority of the following seven fields of short-term experts : Maintenance and Inspection 1~3, Product Development, Pattern Making, Sand Reclamation Process and Advanced Material for Casting Products
- (2) List of specific target products for the field of Product Development and Plan for developing new products in the future
- (3) List of machineries and equipments for the field of Sand Reclamation Process which are necessary for technology transfer
- (4) Activities for the fields of Product Development and Sand Reclamation Process include many different things and the recruitment of these experts are difficult. So please set a limit to the fields of these activities.
- (5) Referring to the fields of Product Development and Pattern Making, the "Persons the Guidance by a Expert are aimed at" are completely same ones, that is, Mr. Mohd Zurani Abdul Wahab and Mr. Kamarullail Mahad. It is not desirable for effective technology transfer. So please rearrange these persons for the two fields.
- (6) According to the proposed activities schedule of dispatching short-term experts, the period of dispatching each expert is different from each other. It is better to dispatch some experts at the same time during the same period for effective technology transfer. So please reconsider this schedule.

6. About supplying Spare parts

- (1) Specification of Guide pin for pattern plate and flask (spare part No.1 in Appendix02) is not clear. Please specify it.
- (2) Aluminium bottom plate and flask (No.3) and Aluminium bottom plate for large flask (No.4) are not included in equipments which were provided by Japanese side. And these spare parts could be purchased in Malaysia. Please confirm it.

It would be highly appreciated if you prepare the answers to the above comments and questions, and send them back through JICA Malaysia Office at its earliest convenience, not later than 16th February, 1998.

Thank you for your cooperation and we are very looking forward to seeing you in Malaysia.

Sincerely yours,

Shiro Kitazawa
Staff
First Technical Cooperation Division
Mining and Industrial Development Cooperation Department
Japan International Cooperation Agency (JICA)



- MPTC(3081)/18/1
- 16 February 1998

Resident Representative
Japan International Cooperation Agency
Suite 18.1W, 18th. Floor
Wisma Sime Darby
Jalan Raja Laut
50350 Kuala Lumpur
(Att. : Mr. Taisuke Watanabe)

Dear Sir,

**ADDITIONAL QUESTIONNAIRE - AFTERCARE PROGRAMME ON THE
TECHNICAL COOPERATION PROGRAMME FOR THE PROJECT ON FOUNDRY
TECHNOLOGY UNIT (FTU) IN SIRIM**

With reference to above matter, attached herewith the additional questionnaire for your further action with JICA Headquarters in Tokyo.

Should you have any enquiry please do not hesitate to contact me at 03-556 6655 or fax 03-556 6673.

Thanking you in advance for your attention and cooperation.

Yours Sincerely,

(MOHD AKHIR YEOP KAMARUDDIN)
Coordinator
Foundry Technology Programme
Industrial and Engineering Design Centre

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1. Centre for Development of Foundry Industry (Centre)
 - 1.1 The said Centre is the Rasa Foundry and Engineering Centre (RAFEC), which is being implemented under the Seventh Malaysia Plan (1996 - 2000) - as referred to in Appendix 08.
 - 1.2 The RAFEC which is being established is one of the recommendations put forward by the Steering Committee on 'Strategic Plan of Action to Enhance the Foundry and Engineering Industries in Malaysia'. The Steering Committee was chaired by the Secretary General of the Ministry of Science, Technology and the Environment.
 - 1.3 The proposed Centre is to be located in Rasa Foundry and Engineering Park, which is about 60 km to the north of Kuala Lumpur. Area of 38,874 m² (418,436 ft²) is allocated for the said Centre.
 - 1.4 Statutory status - SIRIM is responsible to establish and operate RAFEC on behalf of the Government of Malaysia in order to enhance the foundry and engineering industries. The proposed organisation chart once the Centre fully operation as shown in Appendix I.
 - 1.5 Mission of the RAFEC
 - To enhance the foundry industry competitiveness through technology advancement and quality casting products.
 - To fulfil the need of the stakeholders (SIRIM Berhad).
 - 1.6 Staff allocation - it is planned 58 personnel to operate the Centre when it is fully operational.
 - 1.7 Capital Budget allocation (for land, building and machinery) - a total RM 31,200,000 had been approved in principle by the Government of Malaysia to implement the project.
 - 1.8 Facilities of the Centre - refer Appendix II.
 - 1.9 Relationship with FTP - The RAFEC project is an enhancement and expansion of the Foundry Technology Programme (FTP) and FTP is responsible to implement all the plans.
2. Impact of Reorganization of SIRIM on FTP
 - 2.1 The function and activities of FTP is to enhance the foundry industry in Malaysia in line with the objectives the establishment of RAFEC. FTP will be absorbed under the Centre when it is fully operation.

SIRIM was corporatised on the 1st September 1996. In-line with the SIRIM's corporate objectives, FTP has to achieve self-sufficiency, with 60% of the revenue to be derived from from commercial activities and 40% from statutory (government-directed) activities by the year 2000.

- 2.2 Activities of FTP is in line with the SIRIMs' Business Plan.
- 2.3 The operation of FTP is to fulfill the Business Plan requirements.
- 2.4 The function and activities of FTP is still accepted by the clients, and not affected by the corporatisation in general.
- 2.5 Revenue
- 1997 - RM 374,568.50
- 1996 - RM 122,696.25
- 2.6 The usage of revenue - the revenues go into SIRIMs' central fund.

3. Short Term Experts

3.1 Priority of the short term experts :

Priority	Name of Expertise	Comment
1	Maintenance & Inspection I - Moulding plant	To ensure the equipment in a very satisfactory condition to support the technology transfer programme
1	Maintenance & Inspection II - Melting Workshop	To ensure the equipment in a very satisfactory condition to support the technology transfer programme
1	Maintenance & Inspection III - X-Ray Fluorescence Spectrometer	To ensure the equipment in a very satisfactory condition to support the technology transfer programme
2	Product Development - casting design of complicated shape	As the demand to develop the complicated shape of casting products from the Malaysia's foundries, FTP should have the knowledge and skill to carry out the task
2	Pattern Making - for complicated shape of casting	As the demand to develop the complicated shape of casting products from the Malaysia's foundries, FTP should have the knowledge and skill to carry out the task
2	Advanced Material for Casting Products - for severe application; e.g. high-temperature, wear and corrosive resistance	As the demand to develop the casting products for such kind of applications from the Malaysia's foundries, FTP should have the knowledge and skill to carry out the task
3	Sand Reclamation Process	Due to the awareness of the environment quality, the after-treatment of moulding waste especially self-setting moulding sand such as CO ₂ and alpha-set, need to be introduced to Malaysia's foundries. As the resources also will diminish as the time progress, preparation should be done to recycle the said moulding sand.

3.2 Target Products for Product Development

Target products to be developed during the attachment of the short term experts :

Priority	Products	Comments/Remarks
1.	Safety relief valve	For oil and gas industry application; size range of 15 mm to 90 mm; pressure rating up to 2,500 psi; operating temperature up to 550 °C; material stainless steel
2.	Globe valves	
3.	Butterfly valves	
4.	Check valves	
5.	Plug valves	
6.	Needle valves	
7.	Centrifugal pump	

Future plan to develop new products : the developed products will be first produced in the RAFEC's pilot plant before being transferred to the local foundries.

3.3 List of machinery and equipment for Sand Reclamation Process

The sand reclamation system comprising of :

- i) Shake out machine
- ii) Sand fine rough and fine crushing machine
- iii) Magnetic separator
- iv) Siever (screen)
- v) Stripper for impurities
- vi) Temperature controller and cooler
- vii) Sand Storage

The system is not available locally. Example of the system is Sand Reclamation System manufactured by Sintokogio Ltd. Model NSS.

3.4 Product Development and Sand Reclamation Process - scope of work of the experts

Product Development Expert

The expert shall have at least 10 years actual industrial experience in casting design and development, and is responsible to perform the following scope of work :

- i) To transfer appropriate technology in the product development to the Malaysian counterparts comprising of :
 - Product drawing - with the consideration of; quality aspect of the design, decide on the type and quantity of core, patterns' material, estimate the weight of casting, and manufacturing cost
 - Casting drawing with consideration of; pattern draft, finishing allowance, machining allowance, etc.
 - Pattern design including; gating system, pattern design and core boxes.
 - Gating system design including; riser - shape and dimension, gating - cross section of ingate and runner, gating ratio, shape, dimension, etc.

- ii) To formulate in-house training programmes for both the Malaysian counterparts and the foundry operators in related to the product development processes and methodology whenever permitted.
- iii) To render consultancy services to the industries in the field related to the casting product development together with the Malaysian counterparts.
- iv) To develop the specification for the product as listed in 3.2

Pattern Making

The expert shall have at least 10 years actual industrial experience in pattern making and is responsible to perform the following scope of work :

- i) Transfer the technology in the pattern making to the Malaysian counterparts including the decision on contraction allowance, machining and finishing allowance, draft or taper allowance, core print, construction of patterns, pattern coating, core making, etc. This also include the gating system making, the pattern assembly and trial casting.
- ii) To formulate in-house training programmes for both the Malaysian counterparts and the foundry operators in related to the pattern making processes and methodology whenever permitted.
- iii) To render consultancy services to the industries in the field related to the pattern making together with the Malaysian counterparts.
- iv) Pattern making will be based on the product development as mentioned in 3.2 above.

3.5 Product Development and Pattern Making

As the casting product development is very closely related with the pattern making, hence only one researcher is responsible for the both tasks. As we are facing a shortage of staff at the time being, the counterparts nominated for the both Product Development and the Pattern Making experts will become the reference point for the new staff to be recruited in the future.

3.6 Schedule of dispatching short-term experts

As the FTP is facing a shortage of personnel at present and due to the difficulty in the contingency planning, we feel that the proposed schedule is to be followed or other proposals be made during the survey team visit.

4. Spare Parts

- 4.1 Specification of the guide pin for pattern plate and flask (spare part No. 1 of Appendix 02)
The guide pin is known as a guide pinbush as mention in R/D no. 203-1,203-2 and 203-3 of Annex 21 of the Joint Evaluation Report on the Japanese Technical Cooperation for the Project on Foundry Technology Unit, Standards and Industrial Research Institute of Malaysia dated 1 June 1993.

4.2 Aluminium bottom plate and flask (No. 3) and aluminium bottom plate for large flask (No. 4)

Aluminium bottom plate is known as a moulding board as mention in R/D no. 203-2 and 203-3 of the Report mentioned in 4.1 for moulding flask 580 x 460 x 250/250 and 300 x 240 x 200/200 respectively.

5. Appendix A - Present Organization Chart of SIRIM Berhad

Refer to Appendix III.

6. List of Machineries and Equipment for Supplementary Technical Cooperation

The machineries for this purpose is not needed at this moment, but it might be needed resulting from the discussion during the Survey Team of the Aftercare Programme visit.

7. Detail of Activities of Product Development (Appendix 06)

The activities carried out for the products were :

- Design
- Pattern making
- Moulding
- Melting and material development and formulation
- Finishing
- Machining
- Heat treatment
- Dimensional analysis

Most of the products were developed for SIRIM's cutomers from various sectors.

Prepared by :



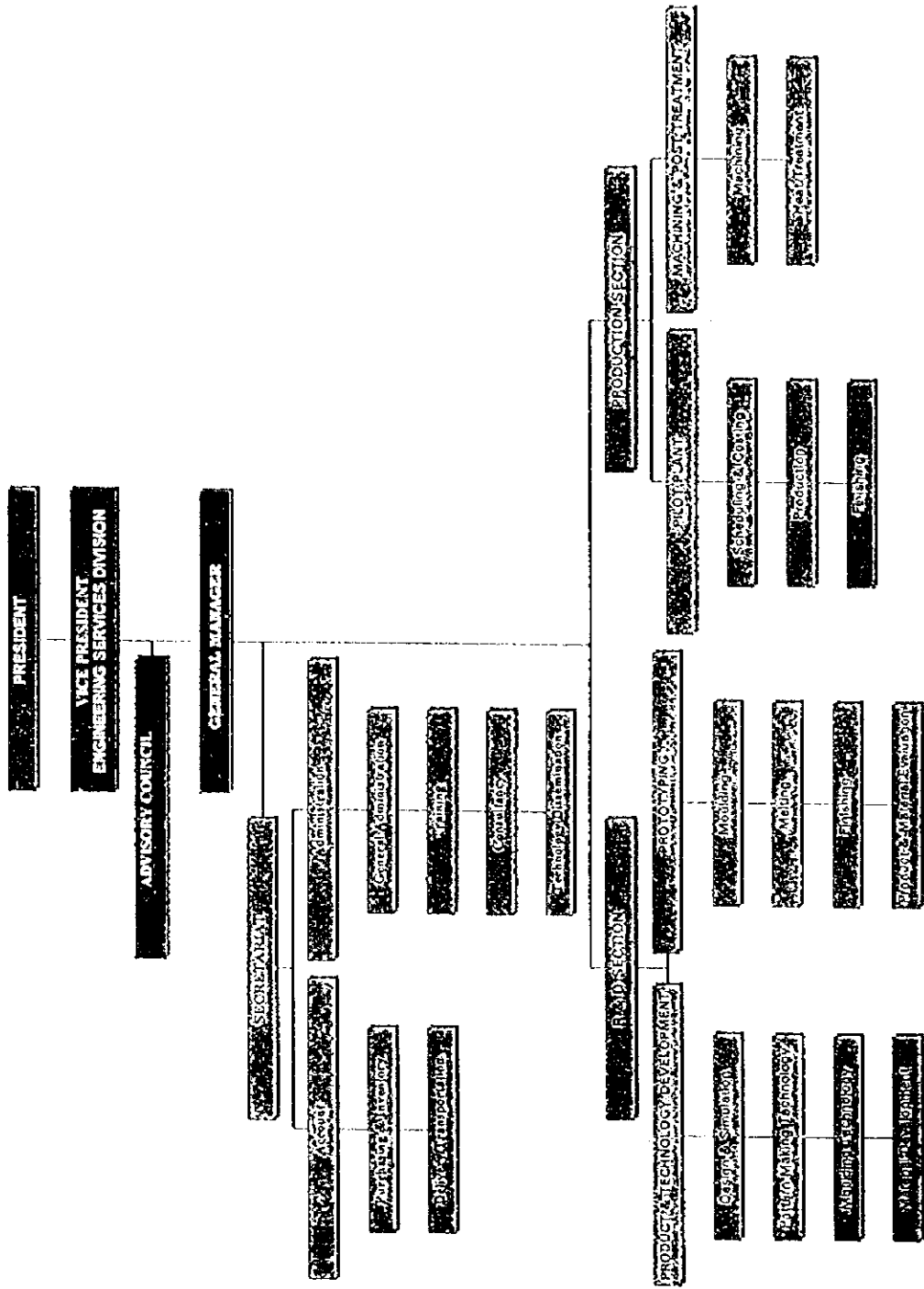
Mohd Akhir Yeop Kamaruddin
Coordinator
Foundry Technology Programme

Approved by :

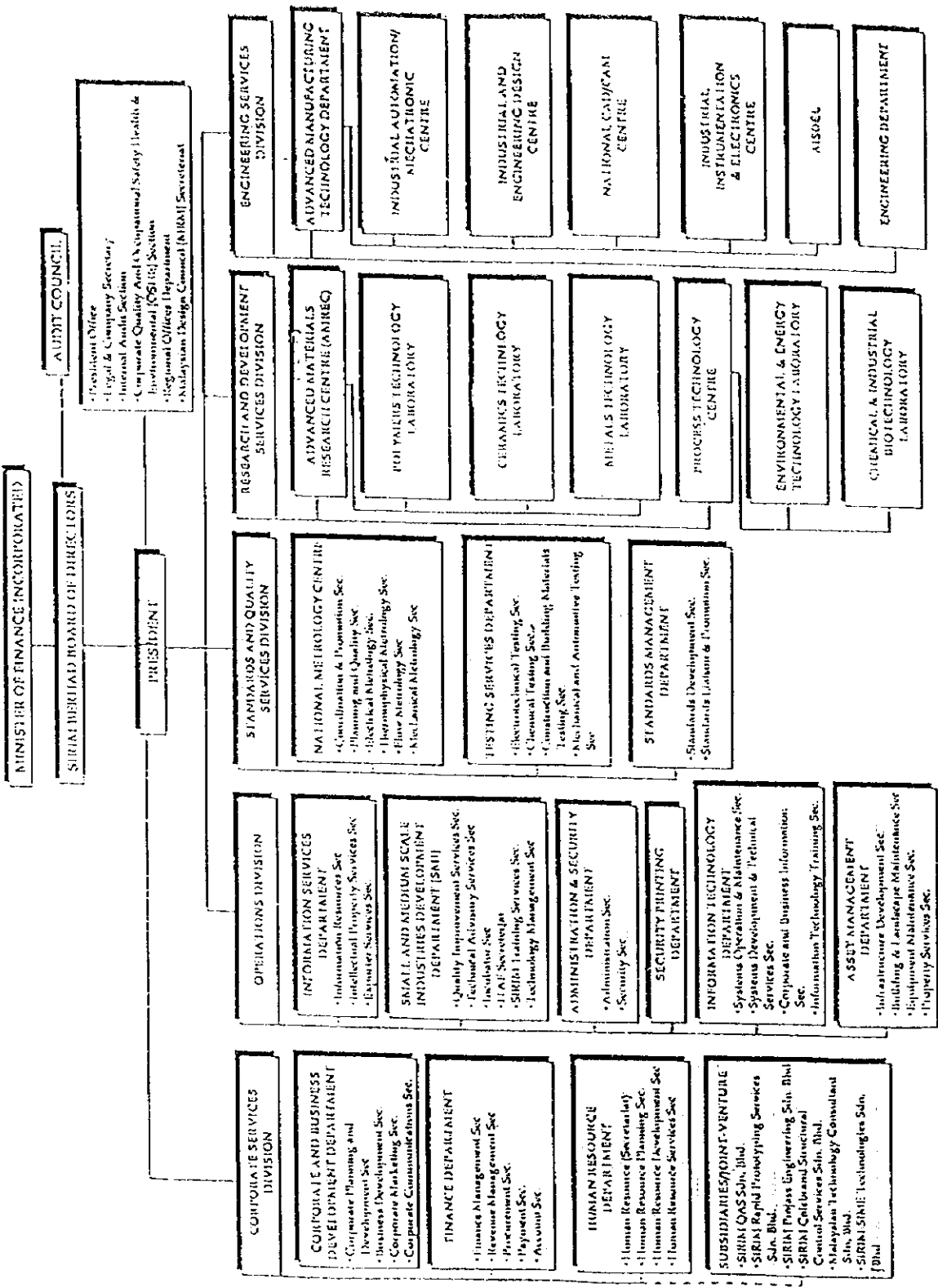


Ab. Halim Ab. Rahman
General Manager
Industrial and Engineering Design Centre
SIRIM Berhad

RASA FOUNDRY AND ENGINEERING CENTRE (RAFEC)
ORGANISATION CHART



SIRIA: SIRIA'S ORGANISATIONAL CHART (S.F. 01.07.1997)



5 既供与機材の現状

1. 既供与機材名・使用頻度・保全状況

プロジェクト協力期間中に JICA から FTP に供与された主要機材について、あらかじめマレーシア側に Questionnaire を送付し、使用頻度・有効使用度・保全状況の観点から、以下の基準で3段階の自己評価を行ってもらった。

(1) 使用頻度・有効使用度

- A：使用回数が多く、有効に使用されている。
- B：使用回数は少ないが、有効に使用されている。
- C：協力終了後は、使用されていない。

(2) 保全状況（メンテナンス）

- A：保全状況良好で、問題なく使用されている。
- B：補修が必要な箇所があるが、使用可能である。
- C：修理を必要とする。

FTP 側による自己評価の結果は、資料第6-1「事前質問書回答」の APPENDIX 01 に記載されているが、それらをまとめると、下表のとおりとなる。

表 使用頻度・保全状況の機材点数

使用頻度・有効使用度			保全状況（メンテナンス）		
評価ランク	機材点数	割合(%)	評価ランク	機材点数	割合(%)
A	227	92	A	221	90
B	5	2	B	19	8
C	14	6	C	6	2
計	246	100	計	246	100

なお、使用頻度・有効使用度に関し、「B」と評価された機材は、試験・検査設備で必要な時のみに使用する設備であるため、本来「A」と評価しても良いものである。

2. 使用頻度・有効使用度 評価ランク「C」の機材について

前述のまとめ表で、「C」と評価された機材14点について、今回調査団で調査した結果、下記のとおり将来計画もあり、有効に使用される可能性を有するので問題はないと判断された。

- (1) シェル成型機
 (2) 同上金型
 (3) 同上金型
- 現在、計画中の FAFEC 設立時には、量産用として使用する予定である。
- (4) 砂乾燥機 : 計画中の RAFEC 設立時に量産用の砂処理設備用として、活用する予定である。
- (5) サーキュラーテーブル : 製品の寸法検査する装置で本来、製品開発に使用しなければならないものであるが、現在カウンターパートの人員が少なく、検査作業を行っていない、将来カウンターパートが増員された時には必然的に使用される。
- (6) イメージョン
 バイロメーター : 破損し使用不能のため、新規に代替品を購入しており、問題はない。
- (7) アルミ溶湯ガス分析機 : アルミの溶解がないため使用していないもので、将来アルミ製品の開発（欠陥解明）には使用される。
- (8) 放射型測温計 : 修理をマレイシア側で行う予定で、修理次第使用する予定である。
- (9) 超音波検査機 : 技術移転されたカウンターパートがいなくなったため、使用していない。今回の短期専門家派遣（溶解）の際に新たに配属されたカウンターパートに技術指導する予定である。
- (10) 砂抗析試験（PEG） : 故障したので、マレイシア側で2度程修理したが、直らなかったため、新規に代替品を購入（日本側の機材供与）する予定である。
- (11) 石定盤 : 前述の5.サーキュラーテーブルと同じ使用目的で、カウンターパートが増員されれば使用される予定である。
- (12) 両刃鋸（300mm）
 (13) 両刃鋸（240mm）
- 完全に破損しており、新規に購入（機材供与）する予定である。
 なお、いずれも消耗品であり、破損は止むを得ない。
- (14) ポータブル帯鋸盤 : ベルトライニングゴムが破損して使用不可の状況である（消耗品であり破損は止むを得ない）。修理部品及び帯鋸刃の予備を購入（日本側の機材供与）する予定である。

3. 保全状況について

次に「(2)保全状況」については、評価ランク「A」、「B」もほぼ同じものであり、96%の機材は良好な状態であると言える。また、評価ランク「C」に評価されたものは、破損または消耗品のスペアパーツがなくなり、修理を必要とするものがほとんどで、保全状況不良のものは全くない。各現場には設備保全マニュアルが完備されている。プロジェクト協力期間中、長期専門

家が作成したもので、終了後5年経過しているが、現在もなお保管され、使用されていることは立派である。このような観点から評価すると、保全状況はすべて「A」ランクに評価されても良いと思う。マレーシア側より、特別にメンテナンスが必要な機材及び供与して欲しい機材についてその不具合状況のチェックを行った。

- (1) 模型定盤と枠のガイドピン : 長期の使用による破損で使用不能のものがあり、予備品が必要である。
- (2) ジョルトスクイズ造型機操作バルブ : 特別なバルブであるため予備品が必要である。
- (3) アルミ定盤(中型枠用、大型枠用) : 量産試験を行うには現在の数では不足である。
- (4) 集じん機用マグネットスイッチ : 砂ミキサー用のマグネットスイッチがオーバーロードで使用不能のため、その代用として集じん機用のマグネットスイッチを使用している状況であった。砂ミキサーの運転が過負荷にならないように注意するよう指導した。
- (5) ロータップ砂試験器用ふるい : 使用頻度が高く、ふるいが磨耗している。
- (6) 通気度砂試験器内部ゴム : 寿命による破損で交換が必要である。
- (7) 砂水分計用ランプ : 赤外線ランプの予備品がなくなっている。
- (8) 砂抗圧試験器 : 不具合により(破損)交換が必要である。
- (9) ガス測定用シール : 寿命による破損で交換品と予備品も必要である。
- (10) 蛍光X線分析装置 : オーバーホールが必要な時期にきている。
- (11) 高周波誘導炉 : " "
- (12) C-S分析装置 : マレーシア側で保守点検を行う。
- (13) 堅形バンドソークランプ装置 : ボルト、ナットが破損しておりマレーシア側で調達する。
- (14) " レザーシステム装置 : 使用不能であるが、使用上問題ない。
- (15) 木工用手削り盤 : 削り刃を研磨すれば使用できるため、その研磨方法を指導した。
- (16) 木工用バンドソー : バンドソーの目立てをすれば使用できるため、目立て方法を指導した。
- (17) 木工用鋸(300mm、240mm) : 予備品を含め追加が必要である。
- (18) 帯鋸盤 : ゴムライニングの破損及び鋸歯の予備品が不足している。

PRODUCT DEVELOPMENT

No.	Year	Product	Remarks
1.	1993	Casting components for bend and re-bend machine	The machine is used the steel mill.
2.	1994	Wood Cutter	- internal programme
		Lathe machine for wood	-internal programme
		Manhole cover	- construction
		Automotive components	- national car R&D
3.	1995	Motocycle handle	- diecasting process
		Camshaft	- national car R&D
		Crankshaft	- national car R&D
		Diecasting components	
4.	1996	Power steering cover	- automotive
		Pulley	- automotive
		Roof tile mould	- construction
		Meter frame	- electronic
		Casting components (5 products) for Engineering	- power generation plant
		BC6 mould blank	- mould and die
		Coconut shell opener	- general engineering
5.	1997	Back pressure steam turbine	- R&D programme
		Nozzle holder	- steel mill
		Bosch	- steel mill
		Bearing cover	- steel mill
		Pulley	- steel mill
		Rear trim shelf mould for Proton Perdana	- national car
		Swivel post	- national electric car
		Pulley for wood lathe machine	- training product for Higher Learning Institution's students



SIRIM
SIRIM BERHAD

FOUNDRY TECHNOLOGY PROGRAMME
TEST & EVALUATION SERVICES - FEES
(Revised rate effective from 1st. September 1996)

Chemical Composition Full Range (XRF Spectrometer + CS Determinator)	
Quantity of Samples	Fees (RM)
1 sample	475.00
2 sample	695.00
3 sample	820.00
4 sample	910.00
5 sample	1,030.00

Chemical Composition (Metal) (CS Determinator)	
Quantity of Samples	Fees (RM)
1 sample	280.00
2 sample	350.00
3 sample	450.00
4 sample	495.00
5 sample	660.00

Chemical Composition (Sand) (XRF Spectrometer)	
Quantity of Samples	Fees (RM)
1 sample	450.00
2 sample	660.00
3 sample	770.00
4 sample	975.00
5 sample	1,090.00

Chemical Composition (Non-Ferrous) (XRF Spectrometer)	
Quantity of Samples	Fees (RM)
1 sample	360.00
2 sample	520.00
3 sample	580.00
4 sample	650.00
5 sample	1,715.00

Microscopy Analysis (Inverted Metallurgical Microscope)	
Quantity of Samples	Fees (RM)
1 sample	400.00
2 sample	650.00
3 sample	950.00

Tensile Test (Shimadzu UTM UH-30B)	
Quantity of Samples	Fees (RM)
1 sample	100.00
2 sample	160.00
3 sample	210.00

Brinell Hardness Test (Nelson APDR BT)	
Quantity of Samples	Fees (RM)
1 sample	150.00
2 sample	250.00
3 sample	300.00

SAND TESTING/ANALYSIS		
Type of Test	Weight/Sample	Fees (RM)
GREEN SAND PACKAGE A - MOULD PROPERTIES <ul style="list-style-type: none"> • Moisture Content • Permeability • Compressive Strength • Compactability • Surface Stability Index 	5 kg	180.00
PACKAGE B - SAND PROPERTIES <ul style="list-style-type: none"> • Active Clay Content • Total Clay Content • Loss-On-Ignition (L.O.I) • Grain Size Distribution • Volatile Matter 	5 kg	300.00
SILICA/NEW SAND ANALYSIS <ul style="list-style-type: none"> • Total Clay Content • Grain Size Distribution • Moisture Content • Loss-On-Ignition (L.O.I) • Actual Specific Surface • Water Absorptive Ability • pH Value 	5 kg	260.00
BENTONITE ANALYSIS <ul style="list-style-type: none"> • Moisture Content • Swelling Force • pH Value • Methylene Blue Absorptive Ability 	500 g	180.00
COAL DUST ANALYSIS <ul style="list-style-type: none"> • Moisture Content • Ash Content • Volatile Matter • Fixed Carbon 	500 g	180.00
STARCH ANALYSIS <ul style="list-style-type: none"> • Moisture Content • Ash Content • pH Value 	500 g	170.00

8 新素材分野のターゲット製品と関連現有設備



THE AFTERCARE PROGRAMME FOR THE PROJECT ON FOUNDRY TECHNOLOGY UNIT IN MALAYSIA

ADVANCED MATERIAL FOR CASTING PRODUCTS - TARGET PRODUCTS

Purpose.

To develop the material for casting products in severe application, e.g. high-temperature, wear and corrosive resistance

Application

For oil and gas industry application; size range of 15 mm to 90 mm; pressure rating up to 2,500 psi; operating temperature up to 550 °C; material stainless steel

Example of the products as attached.

Target Products to be Developed :

1. Safety relief valve
2. Globe valves
3. Butterfly valves
4. Check valves
5. Plug valves
6. Needle valves
7. Centrifugal pump

Future plan to develop new products

The developed products will be first produced in the RAFEC's pilot plant before being transferred to the local foundries.

**THE AFTERCARE PROGRAMME FOR
THE PROJECT ON FOUNDRY TECHNOLOGY UNIT IN MALAYSIA**

FACILITIES FOR ADVANCED MATERIAL FOR CASTING PRODUCTS

No.	Name of Equipment	Specification	Quantity
1.	Hardening Furnace	Microprocessor controlled Maximum Temperature : 1200 °C Power Rating : 48 kW; 415 V; 3 phase; 50 Hz Internal dimension : 1000 mm x 1000 mm x 1000 mm	1 unit
2.	Tempering furnace	Microprocessor controlled Maximum Temperature : 750 °C Power Rating : 24 kW; 415 V; 3 phase; 50 Hz Internal dimension : 1000 mm x 1000 mm x 1000 mm	1 unit
3.	Quenching tank	Microprocessor controlled quenching tank with electric agitator. Dimension : 1100 mm x 1100 mm x 450 mm	1 unit
4.	High Frequency Induction Furnace	Ajax magnethermic 25 kW; 10 kHz Pachydyne power control with remote control panel Pneumatic lift coil mechanism Radiation thermometer Melting capacity : up to 10 kg.	1 unit



THE ENHANCEMENT PROGRAMMES FOR FOUNDRY
AND ENGINEERING INDUSTRIES
IN MALAYSIA THROUGH
THE RASA FOUNDRY AND ENGINEERING CENTRE
(RAFEC)

THE ENHANCEMENT PROGRAMMES FOR
FOUNDRY AND ENGINEERING INDUSTRIES IN MALAYSIA THROUGH
THE RASA FOUNDRY AND ENGINEERING CENTRE (RAFEC)

1. INTRODUCTION

The foundry industry in Malaysia began more than 50 years ago with the production of various cast iron products for the tin mining and rubber processing industries.

Castings of various alloy compositions and produced from a selection of moulding techniques with the appropriate physical and mechanical strengths, corrosion/oxidation resistance properties form the major bulk and core of heavy machineries, machine tools, press and forming equipment, process and chemical plant, large and complex moulds and dies.

The industry is considered a *strategic asset* to the Malaysia's industrialisation program, and the vision has to be established to provide a continuing basis for collaboration with public and private sector institutions.

2. BACKGROUND

2.1 Overview of Malaysia Foundry Industry

2.1.2 Technology Level

The technology development of the majority local foundries is linked traditionally to the technology content of replacement market requirements of industries associated in the primary production of tin, rubber, palm oil and other natural resources. Equipment demands of the construction industry and civil engineering works have also contributed to the development of the foundry industry. The level of foundry technology development achieved for the above with respect to the design of castings, alloy selection, pattern and core design and manufacture, melting and moulding design and practice, quality control and testing is insufficient for the development of machines and equipment for the modern manufacturing industries. Parts such as machine tool beds can only be produced by foundries capable of melting large volumes of metal of controlled and specific melt composition and temperature and having the technology for moulding these components, but this is very limited.

Heavy equipment manufacturers need structurally sound castings with specific engineering and physical properties to build machineries which are subject to thermal and mechanical cyclic loading conditions, including demanding environmental conditions. With the lacking of these requirements, has disconcerted the precision machine tool and machinery manufacturers from abroad who are keen to invest in Malaysia.

Foundries which provide the engineering infrastructure for capital equipment goods manufacturing need substantiate boost in terms of technology, R&D, markets, product diversification and government policy support mechanisms to enable the foundry industry to provide this vital, essential role to the capital equipment manufacturers.

At present stage, the foundry industry needs a strategic plan of action, both on a short- and long-term basis in order to provide a solid foundation and core for the development of the Machinery and Equipment Group.

Under the Second Industrial Master Plan (IMP2), foundry is one of the supporting industry identified as a highly fragmented factor to the machinery and equipment industry group.

Among factors that inhibited developing of the industry are, shortage of manpower particularly skilled labour, manpower development, technology acquirement capabilities and lack of market.

ENHANCEMENT PROGRAMMES FOR FOUNDRY & ENGINEERING INDUSTRIES

2.1.2 Action by the Government

The Second Industrial Master Plan (IMP 2) has identified that foundry is one of the critical supporting industries need to be developed, besides forging, precision and heavy machining and heat treatment.

To enhance the foundry industry, the government is undertaking a feasibility study with a view to establishing an ultra-modern integrated foundry in stages to meet the needs of the country. This will be done under the Second Industrial Master Plan (IMP2).

2.1.3 Critical Elements of Economic Foundations

Among the critical elements of economic foundations of the foundry industry are, human resources, technology, financing and incentives, supporting services, and physical infrastructure and utilities.

2.1.4 Recommendation of IMP2

Under the IMP2, the Government had recommended :

- *Built capacity in the manufacture of critical components and sub-assembly of selected items categorised under production machinery, tooling and material handling incorporating automation, production machine accessories and parts, testing measuring equipment and its accessories.*

In order to achieve this, the institutional framework should be made.

2.1.5 The Institutional Framework

Creation of an institutional framework provides for greater focus, specialisation and policy coordination, especially in the area of human resource development, research and technology development and development of business related support.

2.1.6 Future Development

The future development of foundry industry should be :

- The preferred suppliers of engineered, net-shape, quality metal components
- Globally competitive
- Well capitalised and profitable
- A source of challenging and well-paying careers
- The world's benchmark for technology and innovation
- Supportive of a strong supplier base

3. OPERATIONAL STRATEGIES

In order to enhance the foundry industry, it is essential to first identify the major key challenges. The survey on the existing Malaysian foundries has revealed that a number of major key challenges to be addressed by the foundry industry have been identified :

- Market and casting application development
- Material and other industrial technologies
- Manufacturing technologies
- Partnerships and collaborations
- Environmental technologies
- Industry health and profitability
- Human resources, education and training

ENHANCEMENT PROGRAMMES FOR FOUNDRY & ENGINEERING INDUSTRIES

3.1 Market and Casting Application Development

The foundry industry is diverse, but its ultimate unity will be defined by its products. The development of new markets and applications is important to the industry's future. To stay competitive, the industry has to continue to study ways of improving the products and innovating the processes it offers to customers. In addition to developing new market, the current market share should be increased and recapture the markets that has lost.

Today's foundry industry is market driven and technically sophisticated. Technology alone will not open new markets. Aggressive marketing strategies, such as in-house design services, will be necessary to reclaim lost markets and open new ones.

3.2 Materials and Other Industrial Technologies

Metallurgy and materials technologies is very important. Applied research on the composition and thermomechanical behaviour of casting materials is to be implemented in order to keep the products competitive.

3.3 Manufacturing Technologies

It is very important to increase the overall productivity, reduce average lead times, and reduce energy consumed. Effective use of the tools such as melting/heating, automation, computer and process controls, is one of the key challenges to overcome.

Metal casting is energy intensive. The foundry industry survival depends on the availability of reasonable priced energy.

3.4 Partnerships and Collaborations

A collaborative partnerships is very important in the foundry in order to achieve the vision. Partnerships with government agencies, suppliers, non-profit professional organisations, and academia will be the foundation of the future competitiveness and technical sophistication.

3.5 Environmental Technologies

The main feedstock of many foundries is post-consumer scrap, which is remelted and formed into new useful products. This material that is going back into the economy, and not dumped into landfills. Foundries should find ways to enhance the cleanliness of its processes, increase both pre- and post-consumer recycling, and explore ways to reduce, and eventually eliminate, its waste stream.

3.6 Industry Health and Profitability

The Malaysian foundries of the future will be profitable. The future stiff competition will come from other metal forming processes such as forging, welding, and mechanical assembly, advanced non-metallic materials, such as plastic and ceramic, and imported castings. In order to become the preferred supplier of net shape metal components, a portions of its financial gains will be reinvested to improve its competitive position. Therefore, successful investments in new technologies and education will pay their best returns.

3.7 Human Resources, Education and Training

Major assets besides customers is people. Sufficient numbers of trained people are needed to ensure the future of foundries. The shortage of people in the industry is realised. Only few higher learning institutions offered foundry education in their syllabus, and few vocational schools teach foundry skills.

Combined the problem is the foundry industry lack of high-tech, glamour status. This resulting the industry experiences difficulty in attracting young people to joint the industry.

Education is the most effective way to address its future human resource challenge. In order for the industry to prosper, continued educational programs of various disciplines are needed.

ENHANCEMENT PROGRAMMES FOR FOUNDRY & ENGINEERING INDUSTRIES

4. THE ENHANCEMENT PROGRAMMES

To contribute the industrialisation program and to fulfil the key challenges explained above, SIRIM Berhad has to be actively promoting the advancement program of the foundry capabilities development together with the foundries in the following disciplines.

4.1 Market and Casting Application Development

The visioned foundries is to produce useful and viable products. Followings are the important areas identified to be enhanced and introduced to contribute to this effort :

- introduction of new processes such as *lost foam casting* technology to make the process more useful to the ferrous foundries
- new casting alloys for improved mechanical and thermal properties such as *austempered ductile iron, high temperature high corrosion resistance steels*
- control and interaction of process variables to improve product quality and reduce the rate of defects/rejection
- cast metal matrix composites to improve strength-to-weight ratios for automotive, aerospace, and other applications
- strengthen the diecasting production technology
- enhancement of product design with the applications of *solidification simulation* and *rapid pattern making*.

4.2 Material and other Industrial Technologies

To provide major benefits to Malaysian foundries, following areas should be progressed :

- improved dimensional control of castings to improve net-shape capabilities
- elimination of casting defects such as *porosity* and *inclusions* to improve product quality and performance
- clean cast metal technology to improve product integrity
- thin wall castings to yield higher components
- identification and standardisation of cast metal properties to enable foundries and designer using similar products
- new alloys for casting products to better compete with sometimes higher strengths offered by forged products

4.3 Manufacturing Technologies

The foundries should be modernised in order to increased the quality and productivity. SIRIM Berhad should assist the foundries to venture into the potential of new manufacturing technologies in the following area :

- control and interaction of process variables to better control of the quality of the finished product
- automated finishing equipment to decrease labour content and upgrade an otherwise slow process
- improvement on core removal methodology to streamline production and decrease labour content of castings
- shorten lead time to get products to market faster than any other process

As energy is also an important part in the running of the industry. The following efforts should be carried out in order to ensure its continued supply :

- waste heat recovery and re-use to promote efficiency and lower operating cost
- advanced sensors and process controls to optimise process energy used
- melting and holding furnace optimisation to conserve energy without interrupting the supply of molten metal to moulds or wasting metal that has already been melted.

ENHANCEMENT PROGRAMMES FOR FOUNDRY & ENGINEERING INDUSTRIES

4.4 Partnerships and Collaborations

The government had identified foundry as one of the industry sector to be enhanced under IMP2. With the establishment of foundry and engineering parks, the relocation of foundries will be easier for the government to provide all necessities regarding to foundries through the participation of its agencies such as SIRIM Berhad. These parks will pool all the foundries, engineering workshops as well as material suppliers. The relationship will be better through technical meetings, trade shows, and published materials, and these groups will serve as hubs around which foundry operators can gather to solve common problems.

The industry's largest partner will be Federal Government with the allocation of RM 31.2 million to establish Rasa Foundry and Engineering Centre (RAFEC).

Suppliers' contributions to the industry's increased productivity and quality have been of the leading importance.

Academia and research institutions will continue to play major role in the foundry industry of the future. They will not only educate scientists and engineers for careers in foundries, but will increasingly be involved in applied research programs.

4.5 Environmental Technologies

In order to create an environmentally friendly foundries, the following activities shall be carried out :

- complete characterisation of waste streams for process modification
- advanced waste treatment technologies and utilisation to seek ways to eliminate waste streams from plant (dumping of wastes is now prohibited/the dumping sites are limited)
- environmentally harmless sand binders and additives to increase employee safety and eliminate toxic waste streams from sand binder systems
- improved methods of sand reclamation to decrease the amount of new sand required for each mould (as the source of new sand is diminishing and getting more expensive)
- beneficial re-use of foundry sand and other solid waste products in applications such as flowable fill, road beds, etc.
- alternative processes of materials for reduced waste generation

4.6 Human Resources, Education and Training

Vision can be achieved by having sufficient number of trained personnel. This shortage can be done through :

- increased in-house education and training
- teach foundry curricula in more technical and vocational schools and training institutes
- sponsorship from industry for high school vocational and apprenticeship
- standardised course in foundry by other government agencies
- increase partnering with state and local government agencies

5. ACTIVITIES AND PROGRAMMES

5.1 Activities

In line with the key challenges had been identified above, SIRIM Berhad as a technology development agency should champion the foundry technology in order to assist Malaysian foundry industry.

The following activities should be undertaken by its proposed Foundry and Engineering Centre (RAFEC) that will be established within Rasa Foundry and Engineering Park, Hulu Selangor, Selangor Darul Ehsan :

- Research and development on process and products activities
- Pilot production of casting products and components

ENHANCEMENT PROGRAMMES FOR FOUNDRY & ENGINEERING INDUSTRIES

- Training activities for entrepreneur and skill workers
- Engineering services such as heat treatment, machining
- Technical services such as material evaluation and testing
- Information gathering and dissemination
- International networking
- Advice and consultancy services

Figure 1 shows the relationship of activities of the proposed RAFEC.

5.2 Main Programmes

There are two main programmes identified and recommended to be undertaken in its comprehensive development programme by SIRIM Berhad to enhance the foundry industry :

Localisation Programmes

Under this programme, SIRIM Berhad will identify the potential products for the market. It will be comprehensively developed using its capabilities with the cooperation of the identified anchor companies. The product will be pilot produced in its proposed pilot production plant. The technology of production of these products will be transferred to Malaysian foundry with close supervision of SIRIM Berhad.

The objectives of this programme are :

- to localise imported casting products and
- to create new market for the Malaysian foundries.

and.

Vendor Development Programme

This programme will involving subcontracting jobs from anchor companies. The entrepreneur will be trained in the production of casting products which will be supplied to anchor companies.

Main objectives of this programme is :

- to upgrade skills, knowledge and facilities modernisation of the small and medium foundries.

6. TECHNOLOGY CONTENTS

To champion the foundry industry, it is recommended that SIRIM Berhad to include the following technology in its proposed Rasa Foundry and Engineering Centre (RAFEC) as shown in Figure 2 :

- Product development technology which include casting design and solidification using computer aided design (CAD)
- Pattern making technology which include wooden pattern, resin pattern, metallic pattern and rapid pattern making
- Moulding technology which include sand moulding (green sand and self-setting moulding), permanent mould, investment casting, diecasting (gravity, pressure, hot- and cold-chamber) and full mould (expanded polystyrene casting - EPC). With the expected demands on value added precision casting products in future resulting from the government's industrialisation plan, these technology are very crucial.
- Material technology which include alloys development, melting techniques and treatment molten metal such as grain refinement.
- Finishing technology
- Evaluation technology which include destructive and non-destructive evaluation, compositional and dimensional analysis using computer numerical control (CNC).
- Machining technology include conventional techniques as well as computer numerical control technology.
- Post treatment technology include plasma, induction and austempering.

ENHANCEMENT PROGRAMMES FOR FOUNDRY & ENGINEERING INDUSTRIES

7. POTENTIAL PRODUCTS FOR THE PROGRAMMES

Most of the value-added, high quality and precise casting used by the industry in Malaysia were imported. The effort must be done to localise these casting products and components in order to reduce the currency exchange and to create future foundries.

For this purpose, several casting products and components applied by the industry sectors such as off-shore exploration, maritime, machineries and equipment, etc. which had not been tapped have the potential to be developed and produced by Malaysian foundries. The potential and viable products and components identified to be developed and produced by the proposed Rasa Foundry and Engineering Centre (RAFEC) as shown in Table 1. The identification is from the response from various parties such as industries, industrial associations, and government agencies, through the survey.

8. INFRASTRUCTURE REQUIREMENT

8.1 Building

In order to implement the enhancement programme, building will be constructed within Rasa Foundry and Engineering Park in Hulu Selangor, about 90 km north from Shah Alam. Figure 3 shows the location of the proposed centre, while Figure 4 shows the perspective view of the proposed centre and Figure 5 shows its plant layout. Table 2 shows the infrastructure (floor space) requirements of the proposed RAFEC.

8.2 Equipment

For enhancement programme implementation, equipment had been identified according to activities and programmes. Present facilities in Shah Alam which cater the prototyping services will be relocated to the proposed Centre. Table 3 listing the present equipment, while Table 4 shows the list of equipment for the pilot production plant, machining and post treatment. Several equipment are also recommended for acquirement to add to the present.

8.3 Manpower

Estimated about 63 personels comprising of professional and supporting staffs will be required once the proposed Centre is fully operational. The personnel requirement as shown in Table 5. Figure 6 shows the proposed operational chart of the Centre.

To prepare the capable personnel for the enhancement programmes, training and retraining programmes are necessary. The personnel development plan has been identified according to the technology contents as shown in Table 6.

Technology transfer from developed countries such as Japan, Europe and Australia in various identified disciplines is also a key role to accelerate the technology development. Experts in these technology fields as identified in Table 6.

8.4 Budget

RM 32.2 million allocated under Seventh Malaysian Plan by the Government is recommended to be divided into three sub-budget as below :

i.	purchase of land	-	RM 3.0 million
ii.	construction of building	-	RM 8.0 million
iii.	purchase of equipment and facilities	-	RM 20.2 million

Annual allocation to implement the programmes is as recommended in Table 7.

9. FUTURE DEVELOPMENT OF RAFEC

9.1 Machineries and Equipment Development

To enhance further the contribution and participation of RAFEC towards industrialisation programme, SIRIM Berhad should consider to develop the capability in Machineries and Equipment. Followings are the technology contents needed for this purpose :

- machinery and equipment design
- forging technology which include the design of dies and production capability
- automation and control technology
- testing and evaluation technology

10. CONCLUSIONS

As a technology development agency, SIRIM Berhad should implement the above recommendation of the Rasa Foundry and Engineering Centre (RAFEC) closely. This is to ensure that the establishment of RAFEC as a fully integrated foundry industry capable of generating indigenous engineering and technology capability and overcome the key challenges faced by the Malaysian foundry and engineering industries. As a strategic asset to other industries, Malaysian foundries and engineering should capable to manufacture machineries and equipment to be competitive in marketplace.

TABLE

Table 1. Potential casting products by industrial sector for Malaysian market

Application	Products Name	Imported Value in 1996 (RM million)
Off-shore	Pumps Pressure cylinders, gears, valves, other off-shore castings	250 - 350
Maritime (Ship building & repair)	On board machinery & equipment, propellers, cylinders, hoist and anchor, others	850 - 1,500
Agriculture Sector	various parts and components especially replacement market	150 - 200
Construction Sector	Replacement market for machineries and prime movers	1,000 - 2,500
Cement Plant	Replacement parts for crushers, clinkers, and others	250 - 300
Utilities Sector	Pumps, valves, manhole covers, others	100 - 175
Transportation Sector	Rolling stock, bogies, hauliers, others	50 - 75
Wood-based Sector	Woodworking machineries and equipment	10 - 15
Palm-Oil Sector	Various parts and components for palm-oil mill	50 - 100
Mining Sector	Runners, gears, others	80 - 150

ENHANCEMENT PROGRAMMES FOR FOUNDRY & ENGINEERING INDUSTRIES

Table 2. Infrastructure requirements of RAFEC.

NO.	ITEM	QUANTITY (m ²)	ESTIMATED COST (RM)
1.	Procurement of land - @ RM 7.00/square foot - Other services TOTAL (#A)	38,874 (418,436)	2,929,052.00 25,540.00 <u>2,954,592.00</u>
OFFICE BUILDING			
2	Corporate Activities • General office (15 x 10 m) • Meeting/Seminar Room (11 x 10 m) • Discussion/Guess Room (4 x 7 m) • Lecture Room (5 x 7 m) • Surau (7 x 7 m) • General Manager's Office (7 x 5 m) • Manager's Office - R&D (5 x 4 m) • Manager's Office - Production (5 x 4 m) • Officers Room (4 x 5 m x 5) • Exhibition Centre (11 x 10 m) • Design and Product Development Office • x 5 m) • Store (5 x 3 m) • Toilet (7 x 4 m + 6 x 4 m) • Lobby	1,150	690,000.00
	SUB-TOTAL #1	1,150	690,000.00
WORKSHOPS, LABORATORIES & PILOT PLANT			
3.	R&D Activities - Sand Moulding • Mould Making • Melting • Pouring • Finishing • Lost Foam Technique • Safe Area • Store (Material)	750	

Table 2 (Contd.)

	<p>R&D Activities (Die-Casting)</p> <ul style="list-style-type: none"> • Cold-Chamber Die-Casting • Hot Chamber Die-Casting • Low pressure Die-Casting • Gravity Die-Casting • Finishing • Analysis Room • Sample Preparation Room • Die Maintenance & Storage • Office/Discussion/Common Facilities 	800	
4.	<p>Pilot Production - (Foundry)</p> <ul style="list-style-type: none"> • Pattern Making • Moulding • Finishing • Melting • Core Making • Sand Storage • Pattern Storage • General Store • Office/Discussion/Common Facilities 	3,000	
5.	<p>Engineering Activities</p> <p>Machining</p> <ul style="list-style-type: none"> • CNC Machining Centres • CNC Turning Centre • Lathe Machine 	1,275	
	<p>Quality Assurance</p> <ul style="list-style-type: none"> • Mechanical Test & Dimensional Analysis • Sand Test • Radiography • Office/Discussion/Common Facilities • Store 	300	
	<p>Heat Treatment</p> <ul style="list-style-type: none"> • Plasma Hardening system • Induction Hardening System • Hardening and Tempering Furnace • Quenching Tank • Salt Bath • Finished Product • Office/Discussion/Common Facilities • Store • Safety Area 	800	

ENHANCEMENT PROGRAMMES FOR FOUNDRY & ENGINEERING INDUSTRIES

Table 2 (Contd.)

7.	Others • Cafeteria (20m x 10 m) • Guard House (3 m x 5m)	115	
	SUB-TOTAL #2	7,040	6,336,000.00
	OVERALL FLOOR SPACE AREA : B	8,190	7,026,000.00
7.	CONSULTANTS FEE (B')		843,120.00
	TOTAL COST OF CONSTRUCTION : C		7,869,120.00
8.	GRAND TOTAL OF OVERALL DEVELOPMENT (A + C)		10,823,712.00

Note :

- i. Estimate Cost for Office Building Construction : RM 600 per square meter
- ii. Estimate Cost for Pilot Plant Construction : RM 900 per square meter
- iii. Estimated Consultants Fees : 12% of Overall Construction Cost

ENHANCEMENT PROGRAMMES FOR FOUNDRY & ENGINEERING INDUSTRIES

Table 3. Present equipment and facilities for Foundry Technology Programme for prototyping services.

No.	Name of Equipment/Facilities	Quantity
1.	Melting High Frequency Induction Furnace System complete with transformer, power supply 325 kW; 3000 Hz and cooling system <ul style="list-style-type: none"> • 500 kg capacity • 100 kg capacity • 60 kg push-out type • Geared crane ladle - 600 kg • Geared crane ladle - 100 kg • Geared crane ladle - 50 kg • Vertical type ladle preheater • Floor scale - 500 kg • Computer operated C.E. meter • Immersion pyrometer 	1 1 1 2 2 2 1 1 1 1
2.	Moulding <ul style="list-style-type: none"> • Green sand with sand mixer, sand hopper capacity 1000 kg and dust collector • CO₂ sand plant with sand mixer and sand hopper capacity 1000 kg and dust collector • Air compressor • Sand dryer • Jolt squeeze moulding machine • Moulding flask - 1000 x 800 x 300/250 • Moulding flask - 580 x 460 x 250/250 • Moulding flask - 300 x 240 x 200/200 	1 1 1 1 2 3 5 10
3.	Core Making <ul style="list-style-type: none"> • Core blowing machine • Shell core moulding machine 	1 1
4.	Sand Testing Facilities <ul style="list-style-type: none"> • Laboratory mix-muller - 50 kg • Sand rammer for sand specimen • Ro-tap sieve shaker • Rotating sand washer • Permeability tester • Motor driven universal testing machine • Infrared moisture meter 	1 1 1 1 1 1 1

ENHANCEMENT PROGRAMMES FOR FOUNDRY & ENGINEERING INDUSTRIES

Table 3 (Contd.)

	<ul style="list-style-type: none"> • Green hardness tester • Core hardness tester • Methylene blue clay tester • Mouldability tester • Sand surface testing apparatus • Compactability tester • Universal strength machine • Drying oven • Stereo microscope • Transverse strength core box 	<p>1 1 1 1 1 1 1 1 1 1</p>
5.	<p>Pattern Making</p> <ul style="list-style-type: none"> • Thickness Planer • Hand feed planer • Band saw • Universal drilling machine • Wood working lathe machine • Wood working tool grinder • Router machine 	<p>1 1 1 1 1 1 1</p>
6.	<p>Finishing and post treatment</p> <ul style="list-style-type: none"> • Double head grinder • Shot blasting machine • Conventional type lathe machine • Industrial band saw • Tempering and annealing furnace • Hardening furnace • Quenching tank 	<p>1 1 1 1 1 1 1</p>
7.	<p>Testing and Evaluation</p> <ul style="list-style-type: none"> • X-Ray Fluorescence Spectrometer • C,S determinator • Inverted Type Optical Microscope • Universal testing machine - 30 tf • Industrial type Brinell hardness tester 	<p>1 1 1 1 1</p>
8.	<p>Diecasting</p> <ul style="list-style-type: none"> • Cold chamber diecasting machine - 350 ton • Cold chamber diecasting machine - 250 ton • Vibratory bowl • Sand blasting machine 	<p>1 1 1 1</p>

PROJECT BRIEF

ENHANCEMENT PROGRAMMES FOR FOUNDRY & ENGINEERING INDUSTRIES

Table 4. List of equipment and facilities for proposed RAFEC.

NO.	ITEM	QUANTITY	ESTIMATED COST (RM)
1.	Casting Technology Development Programme - "Austempered Ductile Iron"		
	• Integrated salt-bath system	1	400,000.00
	• High temperature sand testing system	1	280,000.00
	SUB-TOTAL #1		680,000.00
2.	"Thermal Post-Casting Treatment" Technology Development		
	• Plasma Hardening System	1	500,000.00
	• Induction Hardening System	1	300,000.00
	SUB-TOTAL #2		800,000.00
3.	Technology Development on Precision Casting for Industrial Application		
	• Computer aided casting product design and development system	4	700,000.00
	• Computer aided simulation system for flow, stress and thermal analysis for sand casting and die-casting	1	380,000.00
	• Tiltable gravity die-casting system	1	500,000.00
	• Low-pressure die-casting system	1	600,000.00
	• Hot-chamber die-casting system	1	800,000.00
	• Vacuum die-casting machine	1	200,000.00
	• Trimming press	1	200,000.00
	• Retrofit die-casting machine	1	140,000.00
	• Lost foam casting system for industrial products	1	1,000,000.00
	SUB-TOTAL #3		4,520,000.00
4.	Development of Pilot Production Plant Program		
	• Relocation of R&D Facilities from Shah Alam		1,000,000.00
	• Transport	2	200,000.00
	• 1.5 ton Induction Furnace melting system	2	1,850,000.00
	• Moulding line/machine	1	2,000,000.00
	• Shell core forming system	1	500,000.00
	• Rapid pattern making system	1	1,000,000.00

ENHANCEMENT PROGRAMMES FOR FOUNDRY & ENGINEERING INDUSTRIES

Table 4 (Contd.)

	• Test facilities for Quality System		
	• Radiography system	1	800,000.00
	• Spark Emission Spectrometer	1	350,000.00
	CNC coordinate measuring facilities	1	500,000.00
	CNC machining centre	2	1,400,000.00
	CNC turning centre	1	500,000.00
	Shot blasting facilities	1	500,000.00
	Furne and dust extraction system		1,500,000.00
	5 ton overhead crane	2	800,000.00
	2 ton fork-lift	1	80,000.00
	Sand plant	1	700,000.00
	SUB-TOTAL #4		13,680,000.00
5.	Others		
	Office furnitures and equipment		520,000.00
	SUB-TOTAL #5		520,000.00
	GRAND TOTAL		20,200,000.00

PROJECT BRIEF

ENHANCEMENT PROGRAMMES FOR FOUNDRY & ENGINEERING INDUSTRIES

Table 5. Personnel requirement for the programmes.

No.	Position	Quantity (Person)
1.	General Manager Grade 24	1
2.	Manager Grade 22 • R&D • Pilot Production	1 1
3.	Researcher Grade 19 • R&D • Pilot Production • Secretariat	5 4 1
4.	Draughtsman Grade 13 • R&D	1
5.	Draughtsman Grade 12 • R&D	3
6.	Technician Grade 13 • R&D • Pilot Production	1 2
7.	Technician Grade 12 • R&D • Pilot Production	12 6
8.	Craftsman II Grade 7 • R&D • Pilot Production	4 16
9.	Administrative Assistant I Grade 9	3
10.	Driver Grade 6	2
	Total	63

Table 6. Personnel development programme and experts requirements.

No.	Fields	Number of Personnels	Number of Experts
1.	Casting Product Design and Development	4	1
2.	Thermal Post-Casting Treatment	3	1
3.	Shell core design and production	2	1
4.	Tiltable gravity diecasting	2	1
5.	Investment casting for industrial application	2	1
6.	Low pressure diecasting	2	1
7.	High pressure/Vacuum diecasting	2	1
8.	High precision machining	2	1
9.	Full mould technology development	2	1
10.	M.Sc. & Ph.D.	6	1

ENHANCEMENT PROGRAMMES FOR FOUNDRY & ENGINEERING INDUSTRIES

Table 7. Annual capital budget (1996 - 2000) requirement according to development plan.

Items	YEAR (RM)					Total
	1996	1997	1998	1999	2000	
1. Land and Building	600,000	3,320,000	3,000,000	3,000,000	1,170,000	11,000,000
2. Equipment and Facilities	-	680,000	-	-	-	680,000
2.1 Development of Austempered Ductile Iron	-	-	-	800,000	-	800,000
2.2 Thermal Post Casting Technology Development	-	1,520,000	1,300,000	350,000	1,350,000	4,520,000
2.3 Development of Precision Casting Technology	-	-	3,000,000	6,680,000	4,000,000	13,680,000
2.4 Development of Pilot Production Plant	-	-	-	300,000	220,000	520,000
2.5 Furniture and Office Equipment	-	-	-	-	-	-
TOTAL	600,000	5,430,000	7,300,000	11,130,000	6,740,000	31,200,000

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PROJECT BRIEF

ENHANCEMENT PROGRAMMES FOR FOUNDRY AND ENGINEERING INDUSTRY

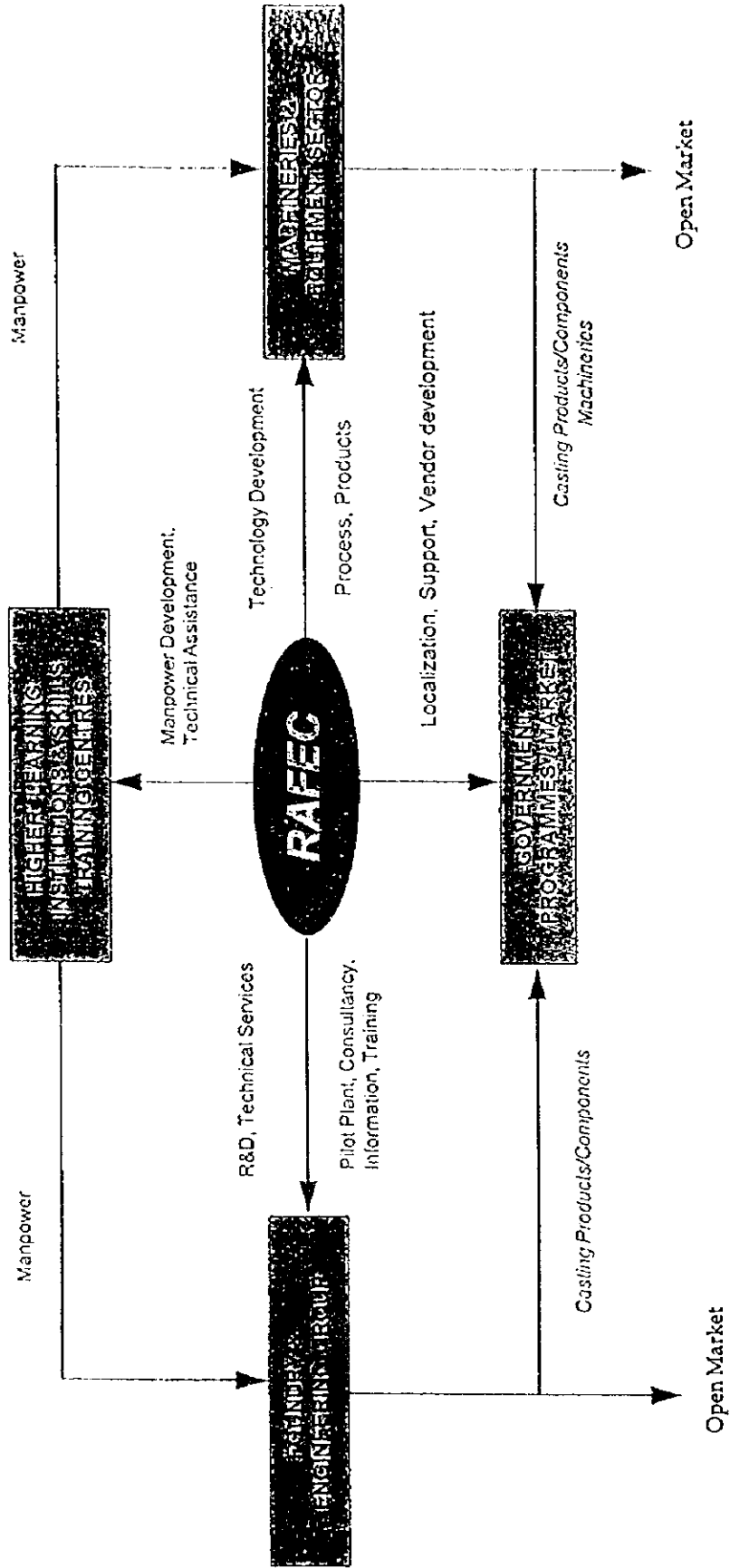


Figure 1. Relationship of RAPEC Activities

PROJECT BRIEF

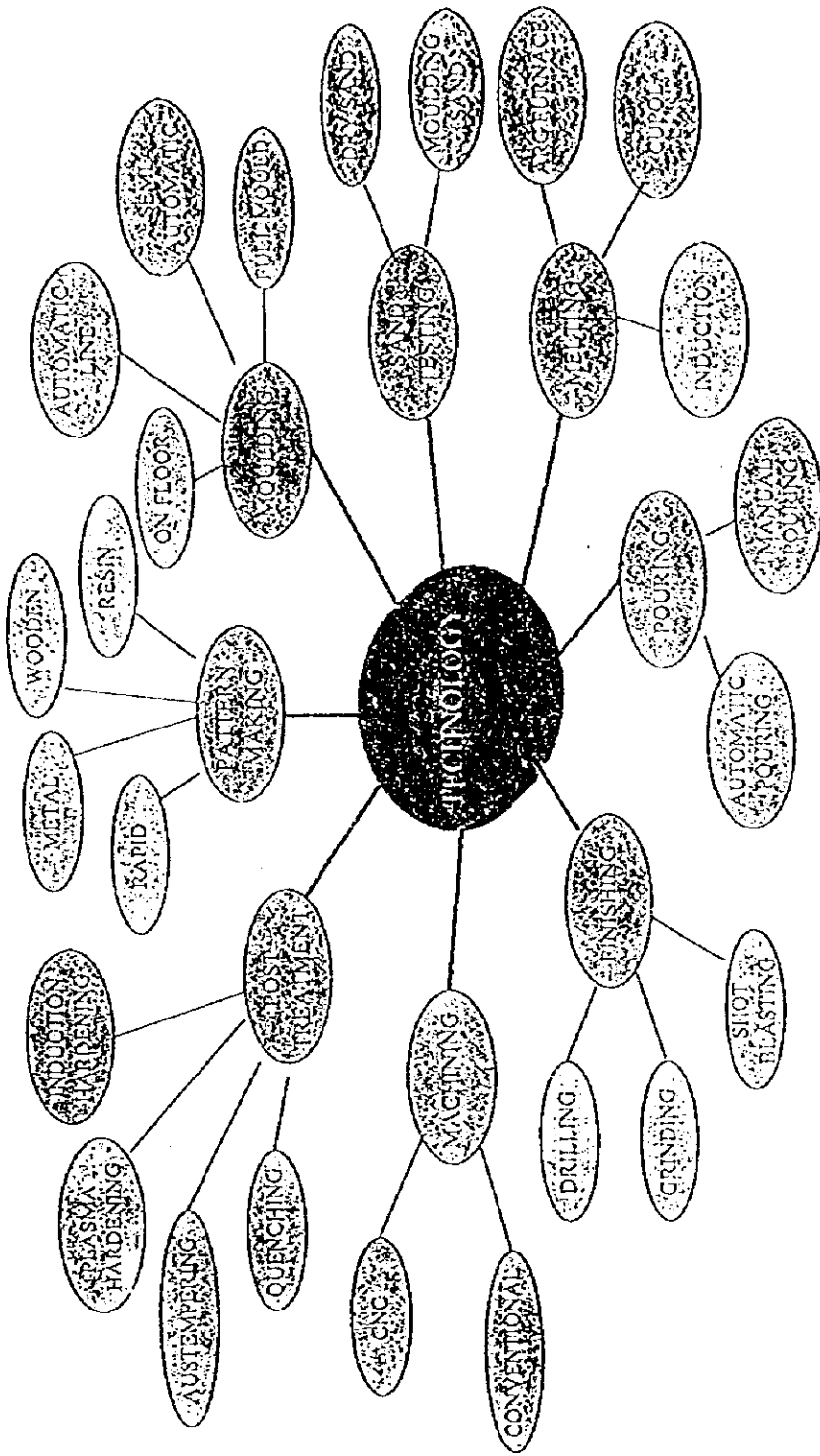


Figure 2. Technology Contents.

PROJECT BRIEF

PROPOSED ORGANISATION
 RASA FOUNDRY AND ENGINEERING CENTRE (RAFEC)

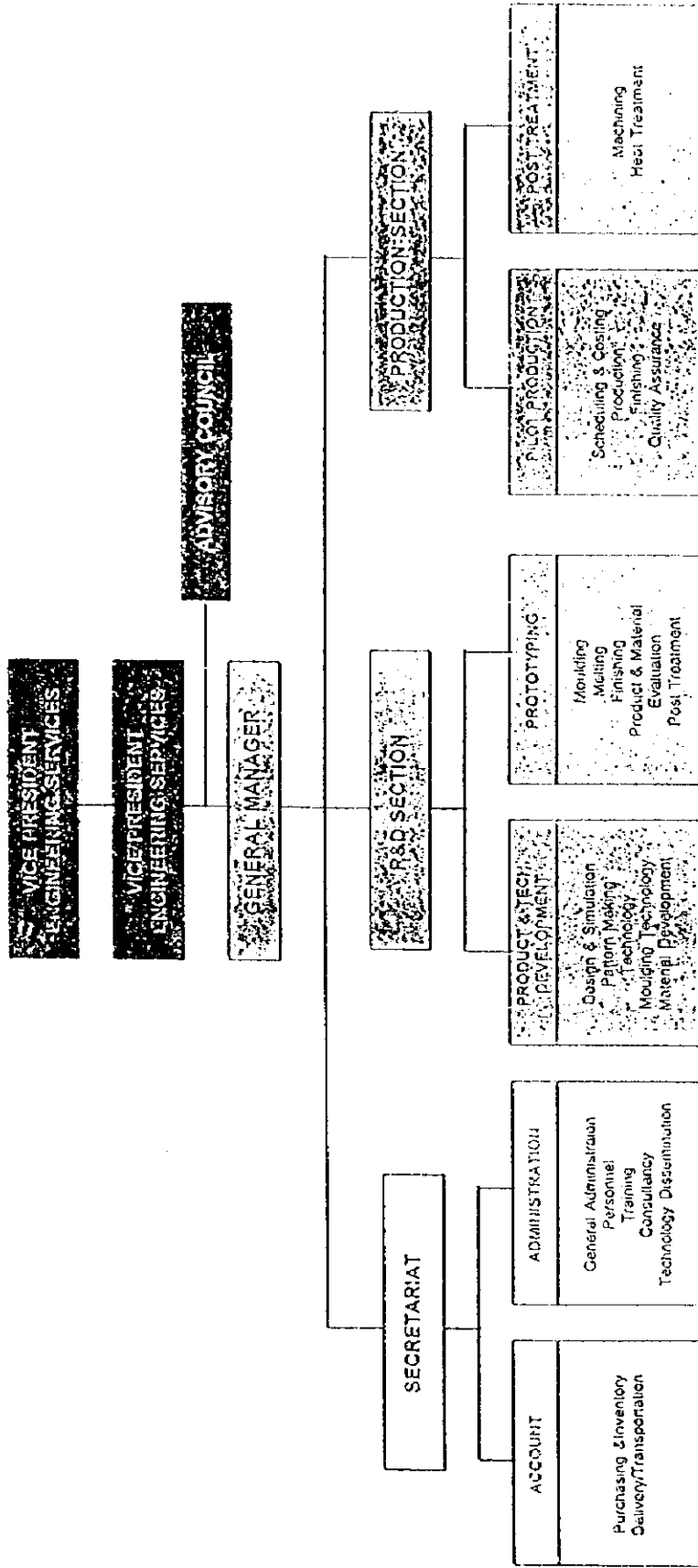
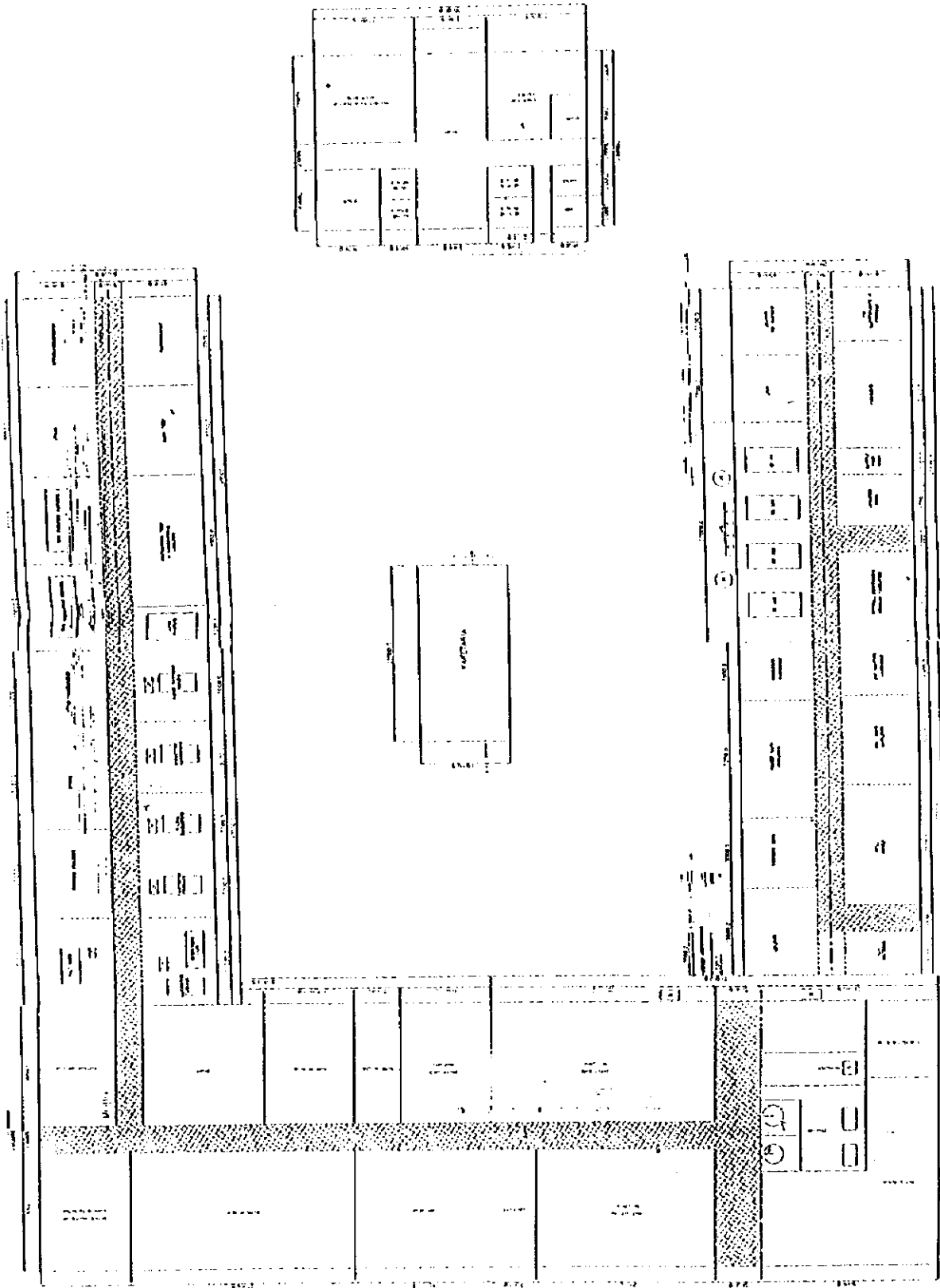


Figure 6. Proposed Organisation Chart for RAFEC

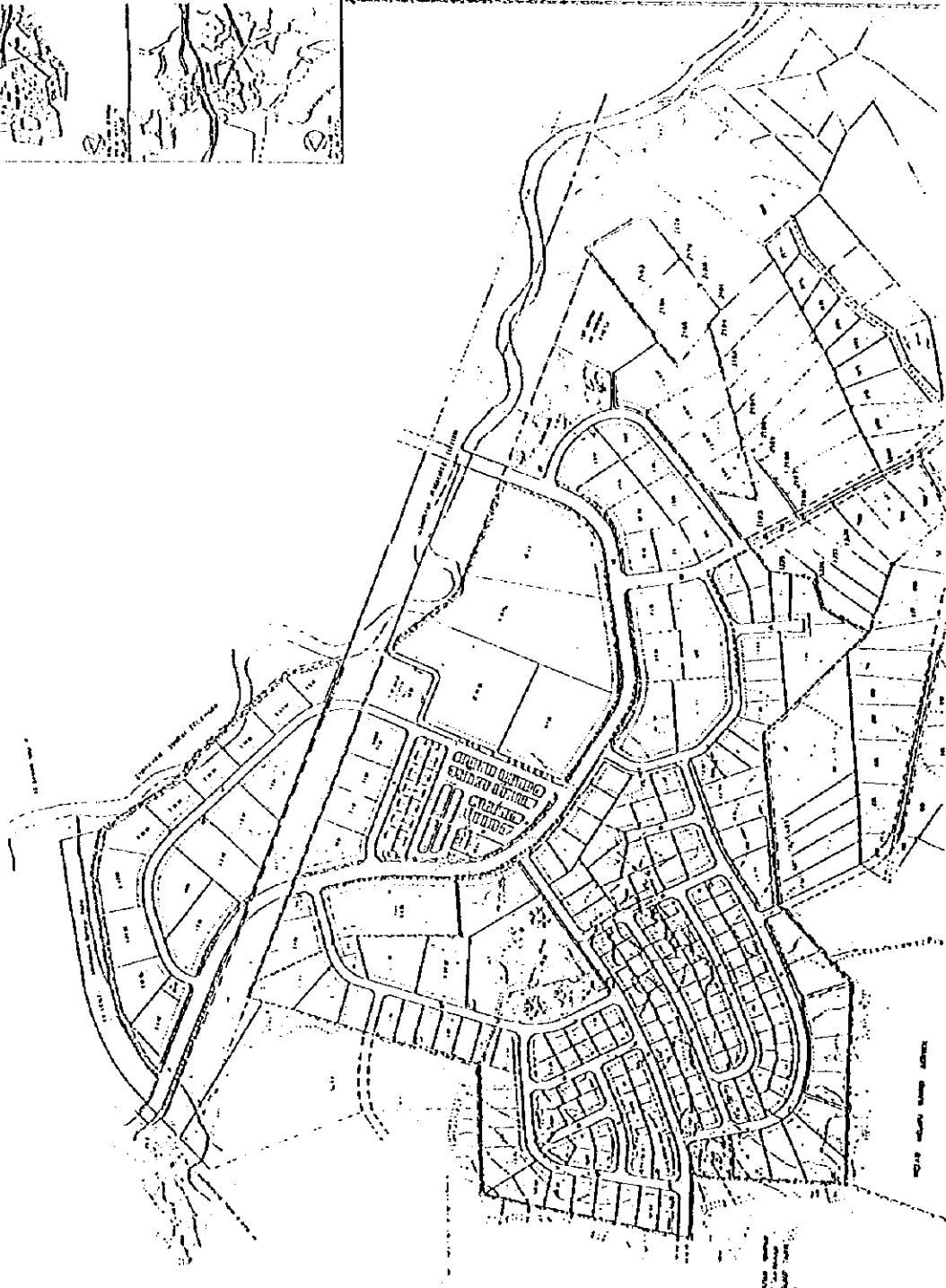


BANGUNAN PERUSAHA
DI MUKAH RASA
DARAU ULU SELAY



SKALA

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3	ALYUMEN	4	ALYUMEN
5	ALYUMEN	6	ALYUMEN
7	ALYUMEN	8	ALYUMEN
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99	ALYUMEN	100	ALYUMEN



JICA